

**PROJECT MANUAL**

**CODE STACK ACADEMY**

**201 N CALIFORNIA ST.  
STOCKTON CA 95202**



**Construction Documents**

**VOLUME 1**



**SAN JOAQUIN COUNTY OFFICE OF EDUCATION  
2907 TRANSWORLD DRIVE  
STOCKTON, CA 95206**



**ARCHITECTNICA**

**CODE STACK ACADEMY**  
for  
**San Joaquin County Office of Education**  
201 N CALIFORNIA ST.  
STOCKTON CA 95202



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**SAN JOAQUIN COUNTY OFFICE OF EDUCATION**  
**FOR**

**CODESTACK ACADEMY**  
**201 N. CALIFORNIA STREET**  
**STOCKTON, CA 95202**

**Project No. & Bid No.**

**010-233-233000**

**San Joaquin County Office of Education**  
**Operations and Support Services Department**  
**2707 Transworld Drive, Stockton, CA 95206**

**NOVEMBER 4, 2024**

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## **NOTICE INVITING BIDS**

### **San Joaquin County Office of Education**

NOTICE IS HEREBY GIVEN that the San Joaquin County Office of Education, acting by and through its Superintendent, hereinafter referred to as “County”, will receive prior to **2:00 PM on the 12<sup>th</sup> day of December, 2024** sealed bids for the award of a Contract for the following:

**BID NO. 010-233-233000**

**CodeStack Academy – 201 N. California Street, Stockton, CA 95202**

All bids shall be made and presented only on the forms presented by the County. Bids shall be received in the Office of the **Operations and Support Services at 2707 Transworld Drive, Stockton, California 95206** and shall be opened and publicly read aloud at the above state time and place. Any bids received after the time specified above or after any extensions due to material changes shall be returned unopened.

The Contract Time is **Three Hundred Eighty (380) Calendar Days**.

CONTRACTOR should consult the General Conditions, Supplementary Conditions, and General Requirements regarding Milestones and Liquidated Damages.

### **Prequalification of Bidders**

As a condition of bidding for this Project, and in accordance with San Joaquin County Office of Education’s procurement regulation AR3311, prospective bidders are required to submit to the County a completed set of prequalification documents on forms provided by the County. These documents will be the basis for determining which bidders are qualified to bid on this Project. Bids will not be accepted if a Contractor has not been prequalified where prequalification is required. Prequalification requirement information is available at the San Joaquin County Office of Education Website at <https://www.sjcoe.org/Operations/Pre-Qualification.aspx>, or at Operations and Support Services Department, San Joaquin County Office of Education, 2707 Transworld Drive, Stockton, California 95206 (209) 468-9061.

### **Miscellaneous Information**

Bids shall be received in the place identified above, and shall be opened and publicly read aloud at the above-stated time and place.

The bid documents are available at:

**San Joaquin County Office of Education  
Operations & Support Services Department  
2707 Transworld Drive, Stockton, CA 95206  
Phone: (209) 468-9061 Fax: (209) 468-9102  
<https://www.sjcoe.org/Construction/>**

There will be a mandatory Pre-Bid Conference at **9:00 AM on the 14<sup>th</sup> day of November, 2024 at 201 N. California Street, Stockton, CA 95202.** Any Contractor bidding on the Project who fails to attend the entire mandatory job walk and conference will be deemed a non-responsive bidder and will have its bid returned unopened.

Each bidder shall be a licensed contractor pursuant to the California Business and Professions Code, and be licensed to perform the work called for in the Contract Documents. The successful bidder must possess a valid and active Class B License at the time of bid and throughout the duration of this Contract. The Contractor's California State License number shall be clearly stated on the bidder's proposal

Subcontractors shall be licensed pursuant to California law for the trades necessary to perform the Work called for in the Contract Documents.

Each bid must strictly conform with and be responsive to the Contract Documents as defined in the General Conditions.

The County reserves the right to reject any or all bids or to waive any irregularities or informalities in any bids or in the bidding.

Each bidder shall submit with its bid — on the form furnished with the Contract Documents — a list of the designated subcontractors on this Project as required by the Subletting and Subcontracting Fair Practices Act, California Public Contract Code section 4100 et seq.

In accordance with California Public Contract Code section 22300, the County will permit the substitution of securities for any moneys withheld by the County to ensure performance under the Contract. At the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the County, or with a state or federally chartered bank as the escrow agent, who shall then pay such moneys to the Contractor. Upon satisfactory completion of the Contract, the securities shall be returned to the Contractor.

Each bidder's bid must be accompanied by one of the following forms of bidder's security: (1) cash; (2) a cashier's check made payable to the County; (3) a certified check made payable to the County; or (4) a bidder's bond executed by a California admitted surety as defined in Code of Civil Procedure section 995.120, made payable to the County in the form set forth in the Contract Documents. Such bidder's security must be in an amount not less than ten percent (10%) of the maximum amount of bid as a guarantee that the bidder will enter into the proposed Contract, if the same is awarded to such bidder, and will provide the required Performance and Payment Bonds, insurance certificates and any other required documents. In the event of failure to enter into said Contract or provide the necessary documents, said security will be forfeited.

The Contractor and all subcontractors shall comply with the requirements set forth in Division 2, Part 7, Chapter 1 of the Labor Code. The County has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this work is to be performed for each craft, classification or type of worker needed to execute the Contract. These per diem rates, including holiday and overtime work, as well as employer payments for health and welfare, pension, vacation, and similar purposes, are on file at the County, and are also available from the Director of the Department of Industrial Relations. Pursuant to California Labor Code section 1720 et seq., it shall be mandatory upon the Contractor to whom the Contract

is awarded, and upon any subcontractor under such Contractor, to pay not less than the said specified rates to all workers employed by them in the execution of the Contract.

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 the Labor Code, 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.

The Contractor and all subcontractors shall furnish certified payroll records as required pursuant Labor Code section 1776 directly to the Labor Commissioner in accordance with Labor Code section 1771.4 on at least on a monthly basis (or more frequently if required by the County or the Labor Commissioner) and in a format prescribed by the Labor Commissioner. Monitoring and enforcement of the prevailing wage laws and related requirements will be performed by the Labor Commissioner/ Department of Labor Standards Enforcement (DLSE).

No bidder may withdraw any bid for a period of ninety (90) calendar days after the date set for the opening of bids.

Separate payment and performance bonds, each in an amount equal to 100% of the total Contract amount, are required, and shall be provided to the County prior to execution of the Contract and shall be in the form set forth in the Contract Documents.

All bonds (Bid, Performance, and Payment) must be issued by a California admitted surety as defined in California Code of Civil Procedure section 995.120.

Where applicable, bidders must meet the requirements set forth in Public Contract Code section 10115 et seq., Military and Veterans Code section 999 et seq. and California Code of Regulations, Title 2, Section 1896.60 et seq. regarding Disabled Veteran Business Enterprise (“DVBE”) Programs. Forms are included in this Bid Package.

Any request for substitutions pursuant to Public Contract Code section 3400 must be made at the time of Bid on the Substitution Request Form set forth in the Contract Documents and included with the bid.

No telephone or facsimile machine will be available to bidders on the County premises at any time.

It is each bidder’s sole responsibility to ensure its bid is timely delivered and received at the location designated as specified above. Any bid received at the designated location after the scheduled closing time for receipt of bids shall be returned to the bidder unopened.

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San Joaquin County Office of Education

## **INSTRUCTIONS TO BIDDERS**

1. **Preparation of Bid Form.** Proposals under these specifications shall be submitted on the blank forms furnished herewith at the time and place stated in the Notice Inviting Bids. All blanks in the bid form must be appropriately filled in, and all proposed prices must be stated clearly and legibly in both words and numerals. All bids must be signed by the bidder in permanent blue ink and submitted in sealed envelopes, bearing on the outside, the bidder's name, address, telephone number, and California Contractor's License number, and the name of the Project for which the bid is submitted. The County reserves the right to reject any bid if all of the above information is not furnished. It is each bidder's sole responsibility to ensure its bid is timely delivered and received at the location designated as specified above. Any bid received at the designated location after the scheduled closing time for receipt of bids shall be returned to the bidder unopened.

2. **Bid Security.** Each bid must be accompanied by one of the following forms of bidder's security: (1) cash; (2) a cashier's check made payable to the County; (3) a certified check made payable to the County; or (4) a bidder's bond executed by a California admitted surety as defined in Code of Civil Procedure section 995.120, made payable to the County, in the form set forth in the Contract Documents. Such bidder's security must be in an amount not less than ten percent (10%) of the maximum amount of such bidder's bid as a guarantee that the bidder will enter into the Contract, if the same is awarded to such bidder, and will provide the required Performance and Payment Bonds, insurance certificates and any other required documents. In the event that a bidder is awarded the Contract and such bidder fails to enter into said Contract or provide the surety bond or bonds within five (5) calendar days after award of the Contract to bidder, said security will be forfeited.

3. **Signature.** The bid form, all bonds, all designations of subcontractors, the Contractor's Certificate, the Agreement, and all Guarantees must be signed in permanent blue ink in the name of the bidder and must bear the signature in longhand of the person or persons duly authorized to sign the bid.

If bidder is a corporation, the legal name of the corporation shall first be set forth, together with two signatures: one from the President and one from the Secretary or Assistant Secretary. Alternatively, the signature of other authorized officers or agents may be affixed, if a certified copy of the resolution of the corporate board of directors authorizing them to do so is provided to the County. Such documents shall include the title of such signatories below the signature and shall bear the corporate seal.

If bidder is a partnership, the true name of the firm shall first be set forth, together with the names of all persons comprising the partnership or co-partnership. The bid must be signed by all partners comprising the partnership unless proof in the form of a certified copy of a statement of partnership acknowledging the signer to be a general partner is presented to the County, in which case the general partner may sign.

Bids submitted as joint ventures must so state and be signed by each joint venturer.

Bids submitted by individuals must be signed by the bidder unless an up to date power- of-attorney is on file in the County office, in which case, said person may sign for the individual.

The above rules also apply in the case of the use of a fictitious firm name. In addition, however, where a fictitious name is used, it must be so indicated in the signature.

4. Modifications. Changes in or additions to the bid form, recapitulations of the work bid upon, alternative proposals, or any other modification of the bid form which is not specifically called for in the Contract Documents may result in the County's rejection of the bid as not being responsive to the Notice Inviting Bids. **No oral or telephonic modification of any bid submitted will be considered.**

5. Erasures, Inconsistent or Illegible Bids. The bid submitted must not contain any erasures, interlineations, or other corrections unless each such correction creates no inconsistency and is suitably authenticated by affixing in the margin immediately opposite the correction the signature or signatures of the person or persons signing the bid. In the event of inconsistency between words and figures in the bid price, words shall control figures. In the event that the County determines that any bid is unintelligible, inconsistent, or ambiguous, the County may reject such bid as not being responsive to the Notice Inviting Bids.

6. Examination of Site and Contract Documents. Each bidder shall visit the site of the proposed work and become fully acquainted with the conditions relating to the construction and labor so that the facilities, difficulties, and restrictions attending the execution of the work under the Contract are fully understood. Bidders shall thoroughly examine and be familiar with the drawings and specifications and all other documents and requirements that are attached to and/or contained in the Project Manual or other documents issued to bidders. The failure or omission of any bidder to receive or examine any Contract Documents, form, instrument, addendum, or other document or to visit the site and become acquainted with conditions there existing shall not relieve any bidder from obligations with respect to the bid or to the contract. The submission of a bid shall be taken as prima facie evidence of compliance with this Section. Bidders shall not, at any time after submission of the bid, dispute, complain, or assert that there were any misunderstandings with regard to the nature or amount of work to be done.

7. Withdrawal of Bids. Any bid may be withdrawn, either personally or by written request, at any time prior to the scheduled closing time for receipt of bids. The bid security for bids withdrawn prior to the scheduled closing time for receipt of bids, in accordance with this paragraph, shall be returned upon demand therefor.

No bidder may withdraw any bid for a period of ninety (90) calendar days after the date set for the opening of bids.

8. Agreements, Insurance and Bonds. The Agreement form which the successful bidder, as Contractor, will be required to execute, and the forms and amounts of surety bonds and insurance endorsements which Contractor will be required to be furnished at the time of execution of the Agreement, are included in the bid documents and should be carefully examined by the bidder. The number of executed copies of the Agreement, the Performance Bond, and the Payment Bond required is three (3). Payment and Performance bonds must be executed by an admitted surety insurer as defined in Code of Civil Procedure 995.120.

9. Interpretation of Plans and Documents/Pre-Bid Clarification. If any prospective bidder is in doubt as to the true meaning of any part of the Contract Documents, or finds discrepancies in, or omissions, a written request for an interpretation or correction thereof may be submitted to the County. The bidder submitting the request shall be responsible for its prompt delivery. **Any interpretation or correction of the Contract Documents will only be made by Addendum duly issued, and a copy of such Addendum will be made available for each contractor receiving 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 County. If discrepancies on drawings, specifications or elsewhere in the Contract Documents are not covered by addenda, bidder shall include in their bid methods of construction

and materials for the higher quality and complete assembly. Each request for clarification shall be submitted in writing, via email, to only the following persons:

TO: Timothy L. Dearborn, AIA at [tim@architechnica.net](mailto:tim@architechnica.net)  
CC: Warren Sun, [wsun@sjcoe.net](mailto:wsun@sjcoe.net)  
Tim Sutton, [tisutton@sjcoe.net](mailto:tisutton@sjcoe.net)

Each transmitted request shall contain the name of the person and/or firm filing the request, address, telephone, and fax number, Specifications and/or Drawing number. Bidder is responsible for the legibility of hand written requests. Pre-bid clarification request shall be filed a minimum of **six (6)** days prior to bid opening. Requests received less than **six (6)** days before bid opening shall not be considered or responded to. A written response to timely pre-bid clarifications requests which materially affects the bidders price will be made by Addendum issued by the County not less than seventy-two (72) hours prior to bid opening.

10. Bidders Interested in More Than One Bid. No person, firm, or corporation shall be allowed to make, or file, or be interested in more than one prime bid for the same work unless alternate bids are specifically called for. A person, firm, or corporation that has submitted a proposal to a bidder, or that has quoted prices of materials to a bidder, is not thereby disqualified from submitting a proposal or quoting prices to other bidders or making a prime proposal.

11. Award of Contract. The Contract will be awarded to the lowest responsive responsible bidder by action of the Superintendent. The County reserves the right to reject any or all bids, or to waive any irregularities or informalities in any bids or in the bidding. In the event an award is made to bidder, and such bidder fails or refuses to execute the Contract and provide the required documents within five (5) calendar days after award of the Contract to bidder, the County may award the Contract to the next lowest responsible and responsive bidder or release all bidders. **Each bid must conform and be responsive to the Contract Documents as defined in the General Conditions.**

12. Bid Protest Procedure. Any bidder may file a bid protest. The protest shall be filed in writing with the County's Division Director for Operations & Support Services, Warren Sun not more than five (5) business days after the date of the bid opening. An e-mail address shall be provided and by filing the protest, protesting bidder consents to receipt of e-mail notices for purposes of the protest and protest related questions and protest appeal, if applicable. The protest shall specify the reasons and facts upon which the protest is based.

a. Resolution of Bid Controversy: Once the bid protest is received, the apparent lowest responsible bidder will be notified of the protest and the evidence presented. If appropriate, the apparent low bidder will be given an opportunity to rebut the evidence and present evidence that the apparent low bidder should be allowed to perform the Work. If deemed appropriate by the County, an informal hearing will be held. County will issue a written decision within fifteen (15) calendar days of receipt of the protest, unless factors beyond the County's reasonable control prevent such resolution. The decision on the bid protest will be copied to all parties involved in the protest.

b. Appeal: If the protesting bidder or the apparent low bidder is not satisfied with the decision, the matter may be appealed to the Assistant Superintendent of Business, or their designee, within three (3) business days after receipt of the County's written decision on the bid protest. The appeal must be in writing and sent via overnight registered mail with all accompanying information relied upon for the appeal and an e-mail address from which questions and responses may be provided to:



**San Joaquin County Office of Education  
Business Department  
2922 Transworld Drive  
Stockton, CA 95206**

c. Appeal Review: The Assistant Superintendent of Business or their designee shall review the decision on the bid protest from the Division Director of Operations and Support Services and issue a written response to the appeal, or if appropriate, appoint a Hearing Office to conduct a hearing and issue a written decision. The written decision of the Assistant Superintendent of Business or the Hearing Officer shall be rendered within fifteen (15) calendar days and shall state the basis for the decision. The decision concerning the appeal will be final and not subject to any further appeals.

d. Reservation of Rights to Proceed with Project Pending Appeal. The County reserves the right to proceed to award the Project and commence construction pending an Appeal. If there is State Funding or a critical completion deadline, the County may choose to shorten the time limits set forth in this Section if written notice is provided to the protesting party. E-mailed notice with a written confirmation sent by First Class Mail shall be sufficient to constitute written notice. If there is no written response to a written notice shortening time, the County may proceed with the award.

e. Finality. Failure to comply with this Bid Protest Procedure shall constitute a waiver of the right to protest and shall constitute a failure to exhaust the protesting bidder's administrative remedies.

13. Alternates. If alternate bids are called for, the Contract may be awarded at the election of the Superintendent to the lowest responsible and responsive bidder using the method and procedures outlined in the Notice Inviting Bids and as specified in the section entitled Alternate/Deductive Bid Alternates.

a. Subcontractor Listing for Alternates. 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.

14. Evidence of Responsibility. Upon the request of the County, a bidder whose bid is under consideration for the award of the Contract shall submit promptly to the County satisfactory evidence showing the bidder's financial resources, surety and insurance claims experience, construction experience, completion ability, workload, organization available for the performance of the Contract, and other factors pertinent to a Project of the scope and complexity involved.

15. Listing Subcontractors. Each bidder shall submit with his bid, on the form furnished with the Contract Documents, a list of the names, license numbers, scopes of work, locations of the places of business, contact information, and Department of Industrial Relations ("DIR") registration numbers of each subcontractor who will perform work or labor or render service to the bidder in or about the project, or a subcontractor who under subcontract to the bidder, specially fabricates and installs a portion of the work, in an amount in excess of one-half of 1 percent of the bidder's total bid as required by the Subletting and Subcontracting Fair Practices Act (Public Contract Code section 4100, et seq.) Pursuant to Labor Code section 1725.5, all subcontractors (of any tier) performing work on this Project must be properly registered with DIR.

16. Workers' Compensation. In accordance with the provisions of Labor Code section 3700, the successful bidder as the Contractor shall secure payment of compensation to all employees. The Contractor shall sign and file with the County the following certificate prior to performing the work under this contract: "I am aware of the provisions of Section 3700 of the Labor Code, which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the

provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.” The form of such certificate is included as a part of the Bid Documents.

17. Contractor’s License. To perform the work required by this notice, the Contractor must possess the Contractor’s License as specified in the Notice Inviting Bids, and the Contractor must maintain the license throughout the duration of the contract. If, at the time of bid, bidder is not licensed to perform the Project in accordance with Division 3, Chapter 9, of the Business and Professions Code for the State of California and the Notice to Contractors calling for bids, such bid will not be considered and the Contractor will forfeit its bid security to the County.

18. Anti-Discrimination. It is the policy of the County that in connection with all work performed under contracts, there be no discrimination against any prospective or active employee engaged in the work because of race, color, ancestry, national origin, religious creed, sex, age, or marital status. The Contractor agrees to comply with applicable federal and California 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 Contractor agrees to require like compliance by any subcontractors employed on the work by such Contractor.

19. Preference for Materials and Substitutions.

a. One Product Specified. Unless the Plans and Specifications state that no Substitution is permitted, whenever the Contract Documents indicate any specific article, device, equipment, product, material, fixture, patented process, form, method, construction, or any specific name, make, trade name, or catalog number, with or without the words, “or equal,” such specification shall be read as if the language “or equal” is incorporated.

b. Request for Substitution. Bidder may, unless otherwise stated, offer any material, process, article, etc., which is materially equal or better in every respect to that so indicated or specified (“Specified Item”) and will completely accomplish the purpose of the Contract Document. If bidder desires to offer a Substitution for a Specified Item, such bidder must make a request in writing on the County’s Substitution Request Form (“Request Form”) and submit the completed Request Form with the bidder’s bid. The Request Form must be accompanied by evidence as to whether the proposed substitution:

- 1) Is equal in quality, service, and ability to the Specified Item as demonstrated by a side by side comparison of key characteristics and performance criteria (CSI comparison chart);
- 2) Will entail no changes in detail, construction and scheduling of related work;
- 3) Will be acceptable in consideration of the required design and artistic effect;
- 4) Will provide no cost disadvantage to the County;
- 5) Will require no excessive or more expensive maintenance, including adequacy and availability of replacement parts; and
- 6) Will require no change in the Contract Time.

In completing the Request Form, bidder must state with respect to each requested substitution whether bidder will agree to provide the Specified Item in the event that the County denies bidder’s request for substitution of a Specified Item. In the event that bidder does not agree in the Request Form to provide the Specified Item and the County denies the requested Substitution, the bidder’s bid shall be considered non-responsive and the County may award the Contract to the next lowest bidder or in its sole discretion, release all bidders. In the event that bidder has agreed in the Request Form to provide the Specified Item and the County denies bidder’s requested substitution for a Specified Item, bidder shall

execute the Agreement and provide the Specified Item without any additional cost or charge to the County, and if bidder fails to execute the Agreement with the Specified Item(s), bidder's bid bond will be forfeited.

After the bids are opened, the apparent lowest bidder shall provide, within five (5) calendar days of opening such bids, any and all Drawings, Specifications, samples, performance data, calculations, and other information as may be required to assist the Architect and the County in determining whether the proposed substitution is acceptable. The burden of establishing these facts shall be upon the bidder.

After the County's receipt of such evidence by bidder, the County will make its final decision as to whether the bidder's request for Substitution for any Specified Items will be granted. The County shall have sole discretion in deciding as to whether a proposed request for Substitution is equal to or better than a Specified Item. Any request for Substitution which is granted by the County shall be documented and processed through a Change Order. The County may condition its approval of any Substitution upon delivery to the County of an extended warranty or other assurances of adequate performance of the Substitution. Any and all risks of delay due to the governmental agency having jurisdiction shall be on the bidder.

20. Disqualification of Bidders and Proposals. More than one proposal for the same work from any individual, firm, partnership, corporation, or association under the same or different names will not be accepted; and reasonable grounds for believing that any bidder is interested in more than one proposal for the work will be cause for rejecting all proposals in which such bidder is interested and the bidder will forfeit their bid security to the County.

21. Unbalanced or Altered Bids. Proposals in which the prices are obviously unbalanced, and those which are incomplete or show any alteration of form, or contain any additions or conditional or alternate bids that are not called for or otherwise permitted, may be rejected. A proposal on which the signature of the bidder has been omitted may be rejected. If, in the County's sole discretion, it determines any pricing, costs or other information submitted by a bidder may result in an unbalanced bid, the County may deem such bid non-responsive. A bid may be determined by the County to be unbalanced if the bid is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that the bid will result in the lowest overall cost to the County even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advanced payment.

22. Employment of Apprentices. The Contractor and all Subcontractors shall comply with the provisions of California Labor Code including, but not limited to sections 1777.5, 1777.6, and 1777.7 concerning the employment of apprentices. The Contractor and any Subcontractor under him shall comply with the requirements of said sections, including applicable portions of all subsequent amendments in the employment of apprentices; however, the Contractor shall have full responsibility for compliance with said Labor Code sections, for all apprenticeable occupations, regardless of any other contractual or employment relationships alleged to exist.

23. Non-Collusion Declaration. Public Contract Code section 7106 requires bidders to submit declaration of non-collusion with their bids. This form is included with the bid documents and must be signed and dated by the bidder under penalty of perjury.

24. Wage Rates, Travel and Subsistence.

a. The Contractor and all subcontractors shall comply with the requirements set forth in Division 2, Part 7, Chapter 1 of the Labor Code. Pursuant to Labor Code section 1770 et seq., the County

has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this work is to be performed for each craft, classification or type of worker needed to execute the contract. Copies are available from the County to any interested party on request and are also available from the Director of the Department of Industrial Relations. The Contractor shall obtain copies of the above-referenced prevailing wage sheets and post a copy of such wage rates at appropriate, conspicuous, weatherproof points at the Site.

b. Any worker employed to perform work on the Project and such work is not covered by any classification listed in the published general prevailing wage rate determinations or per diem wages determined by the Director of the Department of Industrial Relations, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to the employment of such person in such classification.

c. Holiday and overtime work, when permitted by law, shall be paid for at the rate set forth in the prevailing wage rate determinations issued by the Director of the Department of Industrial Relations or at least one and one-half (1½) times the specified basic rate of per diem wages, plus employer payments, unless otherwise specified in the Contract Documents or authorized by law.

d. These per diem rates, including holiday and overtime work, and employer payments for health and welfare, pension, vacation, and similar purposes, are on file at the administrative office of the County, located as noted above and are also available from the Director of the Department of Industrial Relations. It is the Contractor's responsibility to ensure the appropriate prevailing rates of per diem wages are paid for each classification. It shall be mandatory upon the Contractor to whom the Contract is awarded, and upon any subcontractor under such Contractor, to pay not less than the said specified rates to all workers employed by them in the execution of the Contract.

25. DIR Registration of Contractor and Subcontractors. 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 the Labor Code, unless currently registered and qualified to perform public work pursuant to 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.

This Project is a public works project as defined in Labor Code section 1720. Each contractor bidding on this Project and all subcontractors (of any tier) performing any portion of the Work must comply with the Labor Code sections 1725.5 and 1771.1 and must be properly and currently registered with DIR and qualified to perform public works pursuant to Labor Code section 1725.5 throughout the duration of the Project. For more information and up to date requirements, contractors are recommended to periodically review the DIR's website at [www.dir.ca.gov](http://www.dir.ca.gov). Contractor shall be solely responsible for ensuring compliance with Labor Code section 1725.5 as well as any requirements implemented by DIR applicable to its services or its subcontractors throughout the term of the Agreement and in no event shall contractor be granted increased payment from the County or any time extensions to complete the Project as a result of contractor's efforts to maintain compliance with the Labor Code or any requirements implemented by the DIR. Failure to comply with these requirements shall be deemed a material breach of this Agreement and grounds for termination for cause. The contractor and all subcontractors shall furnish certified payroll records as required pursuant Labor Code section 1776 directly to the Labor Commissioner in accordance with Labor Code section 1771.4 on at least on a monthly basis (or more frequently if required by the County or the Labor Commissioner) and in a format prescribed by the Labor Commissioner. The County reserves

the right to withhold contract payments if the County is notified, or determines as the result of its own investigation, that contractor is in violation of any of the requirements set forth in Labor Code section 1720 et seq. at no penalty or cost to the County. Monitoring and enforcement of the prevailing wage laws and related requirements will be performed by the Labor Commissioner/ Department of Labor Standards Enforcement (DLSE).

26. No Telephone or Facsimile Availability. No telephone or facsimile machine will be available to bidders on the County premises at any time.

27. Obtaining Bidding Documents. Bidding Documents, may be obtained from:

**San Joaquin County Office of Education  
Operations & Support Services Department  
2707 Transworld Drive, Stockton, CA 95206  
Phone: (209) 468-9061 Fax: (209) 468-9102  
<https://www.sjcoe.org/Construction/>**

Bidder shall utilize a complete set of Bidding Documents in preparing a bid. The failure or omission of bidder to receive any Bidding Document, form, instrument, Addendum, or other document shall not relieve bidder from any obligations with respect to the bid and/or Contract.

28. Addenda. Clarification or any other notice of a change in the Bidding Documents will be issued only by the County and only in the form of a written Addendum, transmitted by fax, e-mail, or available for pick up to all who are known by the issuing office to have received a complete set of Bidding Documents. Any other purported Addenda are void and unenforceable.

Bidder is responsible for ascertaining the disposition of all Addenda issued regardless of County notification and to acknowledge all Addenda in the submitted sealed bid prior to the bid opening. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for inspection. Each Addendum will be numbered, dated, and identified with the Project number. Oral statements or any instructions in any form, other than Addendum as described above, shall be void and unenforceable. Addenda issued by the County and not noted as being acknowledged by bidder as required in the Bid Form, may result in the bid being deemed non-responsive.

29. Debarment. Bidder may also be subject to debarment, in addition to seeking remedies for False Claims under Government Code section 12650 et seq. and Penal Code section 72, the County may debar a Contractor pursuant to Article 15 of the General Conditions if the Superintendent, or the Superintendent may designate a hearing officer who, in his or her discretion, finds the Contractor has done any of the following:

- a. Intentionally or with reckless disregard, violated any term of a contract with the County
- b. Committed an act or omission which reflects on the Contractor's quality, fitness or capacity to perform work for the County;
- c. Committed an act or offense which indicates a lack of business integrity or business honesty; or,
- d. Made or submitted a false claim against the County or any other public entity (See Government Code section 12650, et seq., and Penal Code section 72)

## **CHECKLIST OF MANDATORY BID FORMS**

(For Contractor's use and reference only. Additional documents may be required so bidders should carefully review all Contract Documents and Bid Documents)

- Designation of Subcontractors
- Bid Form
- Contractor's Certificate Regarding Workers Compensation
- Non-Collusion Declaration
- Bid Bond (or Bid Guarantee form if Security is other than Bid Bond)
- Substitution Request Form (If Substitution Request Form is not submitted then NO Substitutions will be allowed after the bids are opened)
- Acknowledgment of Bidding Practices Regarding Indemnity
- DVBE Participation Statement
- Contractor's Certificate Regarding Drug-Free Work Place
- Contractor's Certificate Regarding Alcoholic Beverage and Tobacco-Free Campus Policy

PRE-BID CLARIFICATION FORM (For Contractor's Use)

PROJECT NAME:	CodeStack Academy – 201 N. California Street		
PROJECT NUMBER:	010-233-233000		
TO:	Tim Dearborn & Tim Sutton	EMAIL:	tim@architechnica.net & tisutton@sjcoe.net

DATE:			
FROM:		EMAIL:	
DOCUMENT/DIVISION NUMBER:		DRAWING NUMBER:	

REQUESTED CLARIFICATION:

RESPONSE TO CLARIFICATION:

Attach additional numbered sheets as necessary; however, only one (1) request shall be contained on each submitted form.

## DESIGNATION OF SUBCONTRACTORS

In compliance with the Subletting and Subcontracting Fair Practices Act (California Public Contract Code section 4100 et seq.,) and any amendments thereof, each Bidder shall set forth below: (a) the name, license number, and location of the place of business of each subcontractor who will perform work or labor or render service to the Contractor, who will perform work or labor or work or improvement to be performed under this Contract, or a subcontractor licensed by the State of California who, under subcontract to the Contractor, specially fabricates and installs a portion of the work or improvements according to detailed Drawings contained in the Plans and Specifications in an amount in excess of one-half of one percent of the Contractor's total bid; and (b) the portion and description of the work which will be done by each subcontractor under this Act. The Contractor shall list only one subcontractor for each such portion as is defined by the Contractor in this bid. All subcontractors shall be properly licensed by the California State Licensing Board.

If a Contractor fails to specify a subcontractor, or if a Contractor 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 Contractor's total bid, the Contractor shall be deemed to have agreed that the Contractor is fully qualified to perform that portion, and that the Contractor alone shall perform that portion.

No Contractor whose bid is accepted shall (a) substitute any subcontractor, (b) permit any subcontractor to be voluntarily assigned or transferred or allow the relevant portion of the work 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 Contractor's total bid where the original bid did not designate a subcontractor, except as authorized in the Subletting and Subcontracting Fair Practices Act.

Subletting or subcontracting of any portion of the work in excess of one-half of one percent of the Contractor's total bid where no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, and then only after a finding, reduced to writing as a public record, of the authority awarding this Contract setting forth the facts constituting the emergency or necessity.

All subcontractors (of any tier) performing any portion of the Work must comply with the Labor Code sections 1725.5 and 1771.1 and must be properly and currently registered with the California Department of Industrial Relations and qualified to perform public works pursuant to Labor Code section 1725.5 throughout the duration of the Project.

**NOTE:** If alternate bids are called for and bidder intends to use different or additional subcontractors on the alternates, a separate list of subcontractors must be provided for each such Alternate.



**DESIGNATION OF SUBCONTRACTORS FORM**

<b>Scope of Work</b>	<b>Name of Subcontractor</b>	<b>Location &amp; Place of Business</b>	<b>License Type and Number</b>	<b>DIR Registration Number</b>	<b><i>E-Mail &amp; Telephone*</i></b>

Scope of Work	Name of Subcontractor	Location & Place of Business	License Type and Number	DIR Registration Number	<i>E-Mail &amp; Telephone*</i>

\* This information must be provided at the time of submission of bid or must be provided within 24 hours after the time set for the opening of bids. Bidders who choose to provide this information within 24 hours after the time set for the opening of bids are solely responsible to ensure the County receives this information in a timely manner. The County is not responsible for any problems or delays associated with emails, faxes, delivery, etc. Absent a verified fax or email receipt date and time by the County, the County's determination of whether the information was received timely shall govern and be determinative. Bidder shall not revise or amend any other information in this form submitted at the time of bid. The information submitted at the time of bid shall govern over any conflicts, discrepancies, ambiguities or other differences in any subsequent Subcontractor Designation Forms submitted by the bidder.

Proper Name of Bidder: \_\_\_\_\_  
Date: \_\_\_\_\_  
Name: \_\_\_\_\_  
Signature of Bidder  
Representative: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone: \_\_\_\_\_  
\_\_\_\_\_

**BID FORM**

**FOR**

**SAN JOAQUIN COUNTY OFFICE OF EDUCATION**

**CODESTACK ACADEMY**

**201 N. California Street, Stockton, CA 95202**

**Project No. & Bid No.:**

**010-233-233000**

**FOR**

**San Joaquin County Office of Education**

CONTRACTOR  
NAME:

\_\_\_\_\_

ADDRESS:

\_\_\_\_\_

\_\_\_\_\_

TELEPHONE:

(       )

\_\_\_\_\_

FAX:

(       )

\_\_\_\_\_

EMAIL

\_\_\_\_\_

TO: San Joaquin County Office of Education, acting by and through its Superintendent, herein called "County".

1. Pursuant to and in compliance with your Notice Inviting Bids and other documents relating thereto, the undersigned bidder, having familiarized himself 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, with the Drawings and Specifications, and other Contract Documents, hereby proposes and agrees to perform within the time stipulated, the Contract, including all of its component parts, and everything required to be performed, including its acceptance by the County, and to provide and furnish any and all labor, materials, tools, expendable equipment, and utility and transportation services necessary to perform the Contract and complete all of the Work in a workmanlike manner required in connection with the construction of:

BID SCHEDULE NO. 010-233-233000

SAN JOAQUIN COUNTY OFFICE OF EDUCATION  
CODESTACK ACADEMY  
201 N. California Street, Stockton, CA 95202

in the County described above, all in strict conformance with the drawings and other Contract Documents on file at the Operations & Support Services Office of said County for amounts set forth herein.

2. BIDDER ACKNOWLEDGES THE FOLLOWING ADDENDUM:

Number	Number	Number	Number	Number	Number	Number	Number
_____	_____	_____	_____	_____	_____	_____	_____

Acknowledge the inclusion of all addenda issued prior to bid in the blanks provided above. Your failure to do so may render your bid non-responsive.

3. TOTAL CASH PURCHASE PRICE IN WORDS & NUMBERS:

\_\_\_\_\_ DOLLARS  
(\$ \_\_\_\_\_)

4. ALLOWANCES: The Bidder's Base Bid shall NOT include the following potential Allowance(s). The District will add some or all of the following Allowance(s) amount(s) to the successful bidder's Contract, at the District's discretion. Contractor shall be permitted to invoice for Work under an Allowance in the identical structure as a Change Order.

Allowance #1: Unforeseen Conditions	\$300,000
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5. TIME FOR COMPLETION: The County may give a notice to proceed within ninety (90) days of the award of the bid by the County. Once the Contractor has received the notice to proceed, the Contractor shall complete the work in the time specified in the Agreement. By submitting this bid, Contractor has thoroughly studied this Project and agrees that the Contract Time for this Project is adequate for the timely

and proper completion of the Project. Further, Contractor has included in the analysis of the time required for this Project, Rain Days, Governmental Delays, and the requisite time to complete Punch List.

In the event that the County desires to postpone giving the notice to proceed beyond this ninety (90) day period, it is expressly understood that with reasonable notice to the Contractor, giving the notice to proceed may be postponed by the County. It is further expressly understood by the Contractor, that the Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of giving the notice to proceed.

If the Contractor believes that a postponement will cause a hardship to it, the Contractor may terminate the contract with written notice to the County within ten (10) days after receipt by the Contractor of the County's notice of postponement. Should the Contractor terminate the Contract as a result of a notice of postponement, the County shall have the authority to award the Contract to the next lowest responsible bidder, if applicable.

It is understood that the County reserves the right to reject any or all bids and/or waive any irregularities or informalities in this bid or in the bid process. The Contractor understands that it may not withdraw this bid for a period of ninety (90) days after the date set for the opening of bids.

6. Attached is bid security in the amount of not less than ten percent (10%) of the bid:

Bid bond (10% of the Bid), certified check, or cashier's check (circle one)

7. The required List of Designated Subcontractors is attached hereto.

8. The required Non-Collusion Declaration is attached hereto.

9. The Substitution Request Form, if applicable, is attached hereto.

10. It is understood and agreed that if written notice of the acceptance of this bid is mailed, telegraphed, or delivered to the undersigned after the opening of the bid, and within the time this bid is required to remain open, or at any time thereafter before this bid is withdrawn, the undersigned will execute and deliver to the County a Contract in the form attached hereto in accordance with the bid as accepted, and that he or she will also furnish and deliver to the County the Performance Bond and Payment Bond, all within five (5) calendar days after award of Contract, and that the work under the Contract shall be commenced by the undersigned bidder, if awarded the Contract, by the start date provided in the County's Notice to Proceed, and shall be completed by the Contractor in the time specified in the Contract Documents.

11. The names of all persons interested in the foregoing proposal as principals are as follows:

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(IMPORTANT NOTICE: If bidder or other interested person is a corporation, state the legal name of such corporation, as well as the names of the president, secretary, treasurer, and manager thereof; if a co-partnership, state the true names of the firm, as well as the names of all individual co-partners comprising the firm; if bidder or other interested person is an individual, state the first and last names in full.)

12. PROTEST PROCEDURES. If there is a bid protest, the grounds shall be submitted as set forth in the Instructions to Bidders.

13. The undersigned bidder shall be licensed and shall provide the following California Contractor's license information:

License Number: \_\_\_\_\_  
License Expiration Date: \_\_\_\_\_  
Name on License: \_\_\_\_\_  
Class of License: \_\_\_\_\_  
DIR Registration Number: \_\_\_\_\_

If the bidder is a joint venture, each member of the joint venture must include the above information.

14. Time is of the essence regarding this Contract, therefore, in the event the bidder to whom the Contract is awarded fails or refuses to post the required bonds and return executed copies of the Agreement form within five (5) calendar days from the date of receiving the Notice of Award, the County may declare the bidder's bid deposit or bond forfeited as damages.

15. The bidder declares that he/she has carefully examined the location of the proposed Project, that he/she has examined the Contract Documents, including the Plans, General Conditions, Supplemental Conditions, Addenda, and Specifications, all others documents and requirements that are attached to and/or contained in the Project Manual, all other documents issued to bidders and read the accompanying instructions to bidders, and hereby proposes and agrees, if this proposal is accepted, to furnish all materials and do all work required to complete the said work in accordance with the Contract Documents, in the time and manner therein prescribed for the unit cost and lump sum amounts set forth in this Bid Form.

16. DEBARMENT. In addition to seeking remedies for False Claims under Government Code section 12650 et seq. and Penal Code section 72, the County may debar a Contractor pursuant to Article 15 of the General Conditions if the Superintendent, or the Superintendent may designate a hearing officer who, in his or her discretion, finds the Contractor has done any of the following:

- a. Intentionally or with reckless disregard, violated any term of a contract with the County;
- b. Committed an act or omission which reflects on the Contractor's quality, fitness or capacity to perform work for the County;
- c. Committed an act or offense which indicates a lack of business integrity or business honesty; or
- d. Made or submitted a false claim against the County or any other public entity. (See Government Code section 12650, et seq., and Penal Code section 72)

17. DESIGNATION OF SUBCONTRACTORS. In compliance with the Subletting and Subcontracting Fair Practices Act (California Public Contract Code section 4100 et seq.) and any amendments thereof, each bidder shall list subcontractors on the County's form Subcontractor list. This subcontractor list shall be submitted with the bid and is a required form

I agree to receive service of notices at the e-mail address listed below.

I the below-indicated bidder, declare under penalty of perjury that the information provided and representations made in this bid are true and correct.

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Proper Name of Company

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Name of Bidder Representative

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Street Address

---

City, State, and Zip

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( )  
Phone Number

---

( )  
Fax Number

---

E-Mail

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Signature of Bidder Representative

**NOTE:** If bidder is a corporation, the legal name of the corporation shall be set forth above together with the signature of authorized officers or agents and the document shall bear the corporate seal; if bidder is a partnership, the true name of the firm shall be set forth above, together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership; and if bidder is an individual, his signature shall be placed above.

All signatures must be made in permanent blue ink.

**CONTRACTOR’S CERTIFICATE REGARDING WORKERS’ COMPENSATION**  
**FORM**

Labor Code section 3700 in relevant part provides:

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

1. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this State.
2. By securing from the Director of Industrial Relations a certificate of consent to self-insure, 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 employees.
3. For any county, city, city and county, municipal corporation, public County, 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 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 provision before commencing the performance of the work of this Contract.

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Print)

\_\_\_\_\_  
(Date)

In accordance with Article 5 (commencing at section 1860), Chapter 1, Part 7, Division 2 of the Labor Code, the above certificate must be signed and submitted with the Contractor’s bid.



**NON-COLLUSION DECLARATION**

The undersigned declares:

I am the \_\_\_\_\_ [Title] of \_\_\_\_\_ [Name of Company], the party making the foregoing bid.

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

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

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on \_\_\_\_\_ [Date], at \_\_\_\_\_ [City], \_\_\_\_\_ [State].

Signed: \_\_\_\_\_

Typed Name: \_\_\_\_\_

**BID GUARANTEE FORM**

**(Use only when not using a Bid Bond)**

Accompanying this proposal is a cashier's check payable to the order of the San Joaquin County Office of Education or a certified check payable to the order of the San Joaquin County Office of Education in an amount equal to ten percent (10%) of the base bid and alternates (\$ \_\_\_\_\_).

The proceeds of this check shall become the property of said County, if, this proposal shall be accepted by the County through the County's Superintendent, and the undersigned fails to execute a Contract with and furnish the sureties required by the County within the required time; otherwise, said check is to be returned to the undersigned.

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Bidder

Note: Use this form, in lieu of Bid Bond form, when a cashier's check or certified check is accompanying the bid

**BID BOND FORM**

KNOW ALL MEN BY THESE PRESENT that we, the undersigned, (hereafter called "Principal"), and \_\_\_\_\_ (hereafter called "Surety"), are hereby held and firmly bound unto the San Joaquin County Office of Education (hereafter called "County") in the sum of \_\_\_\_\_ (\$\_\_\_\_\_) for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors, and assigns.

SIGNED this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

The condition of the above obligation is such that whereas the Principal has submitted to the County a certain Bid, attached hereto and hereby made a part hereof, to enter into a Contract in \_\_\_\_\_ writing \_\_\_\_\_ for \_\_\_\_\_ the \_\_\_\_\_ construction \_\_\_\_\_ of \_\_\_\_\_.

NOW, THEREFORE,

- a. If said Bid is rejected, or
- b. If said Bid is accepted and the Principal executes and delivers a Contract or the attached Agreement form within five (5) calendar days after acceptance (properly completed in accordance with said Bid), and furnishes bonds for his faithful performance of said Contract and for payment of all persons performing labor or furnishing materials in connection therewith,

Then this obligation shall be void; otherwise, the same shall remain in force and effect.

Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract, or the call for bids, or the work to be performed thereunder, or the specifications accompanying the same, shall in anyway 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 the work, or to the specifications.

In the event suit is brought upon this bond by the County and judgment is recovered, the Surety shall pay all costs incurred by the County in such suit, including without limitation, attorneys' fees to be fixed by the court.

IN WITNESS WHEREOF, Principal and Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, on the day and year first set forth above.

(Corporate Seal)

By \_\_\_\_\_

Principal's Signature

\_\_\_\_\_  
Typed or Printed Name

\_\_\_\_\_  
Principal's Title

(Corporate Seal)

By \_\_\_\_\_

Surety's Signature

\_\_\_\_\_  
Typed or Printed Name

\_\_\_\_\_  
Title

(Attached Attorney in Fact Certificate)

\_\_\_\_\_  
Surety's Name

\_\_\_\_\_  
Surety's Address

\_\_\_\_\_  
Surety's Phone Number

**IMPORTANT:**

Surety companies executing bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in California Insurance Code section 105, and if the work or project is financed, in whole or in part, with federal, grant, or loan funds, it must also appear on the Treasury Department's most current list (Circular 570 as amended).

**THIS IS A REQUIRED FORM.**

Any claims under this bond may be addressed to:

(Name and Address of Surety)

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(Name and Address of agent or representative for service of process in California if different from above)

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(Telephone Number of Surety and agent or representative for service of process in California).

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## REQUEST FOR SUBSTITUTION AT TIME OF BID

Pursuant to Public Contract Code section 3400, bidder submits the following request to Substitute with the bid that is submitted. I understand that if the request to substitute is not an “or equal” or is not accepted by County and I answer “no” I will not provide the specified item, then I will be held non-responsive and my bid will be rejected. With this understanding, I hereby request Substitution of the following articles, devices, equipment, products, materials, fixtures, patented processes, forms, methods, or types of construction:

	Specification Section	Specified Item	Requested Substituted Item	Contractor Agrees to Provide Specified Item if request to Substitute is Denied <sup>1</sup> (circle one)	County Decision (circle one)
1.				Yes No	Grant Deny
2.				Yes No	Grant Deny
3.				Yes No	Grant Deny
4.				Yes No	Grant Deny
5.				Yes No	Grant Deny
6.				Yes No	Grant Deny
7.				Yes No	Grant Deny
8.				Yes No	Grant Deny
9.				Yes No	Grant Deny
10.				Yes No	Grant Deny
11.				Yes No	Grant Deny
12.				Yes No	Grant Deny

This Request Form must be accompanied by evidence as to whether the proposed Substitution (1) is equal in quality, service, and ability to the Specified Item; (2) will entail no change in detail, construction, and scheduling of related work; (3) will be acceptable in consideration of the required design and artistic effect; (4) will provide no cost disadvantage to the County; (5) will require no excessive or more expensive

<sup>1</sup> Bidder must state whether bidder will provide the Specified Item in the event the Substitution request is evaluate and denied. If bidder states that bidder will not provide the Specified Item the denial of a request to Substitute shall result in the rejection of the bidder as non-responsive. However, if bidder states that bidder will provide the Specified Item in the event that bidder’s request for Substitution is denied, bidder shall execute the Agreement and provide the Specified Item(s). If bidder refuses to execute the Agreement due to the County’s decision to require the Specified Item(s) at no additional cost, bidder’s Bid Bond shall be forfeited.

maintenance, including adequacy and availability of replacement parts; (6) will require no change of the construction schedule or milestones for the Project; and, (7) Contractor agrees to pay for any agency having jurisdiction plan check costs associated with this Substitution Request. (See General Conditions Section 3.6)

The undersigned states that the following paragraphs are correct:

1. The proposed Substitution does not affect the dimensions shown on the Drawings.
2. The undersigned will pay for changes to the building design, including Architect, engineering, or other consultant design, detailing, agency having jurisdiction plan check costs, and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse effect on other trades, the Contract Time, or specified warranty requirements.
4. Maintenance and service parts will be available locally for the proposed substitution.
5. In order for the Architect to properly review the substitution request, within five (5) days following the opening of bids, the Contractor shall provide samples, test criteria, manufacturer information, and any other documents requested by Architect or Architect's engineers or consultants, including the submissions that would ordinarily be required under Article 3.7 for Shop Drawings along with a document which provides a side by side comparison of key characteristics and performance criteria (often known as a CSI side by side comparison chart).
6. If Substitution Request is accepted by the County, Contractor is still required to provide a Submittal for the substituted item pursuant to Article 3.7 and shall provide required Schedule information (including schedule fragments, if applicable) for the substituted item as required under Article 8.3.2.1. The approval of the Architect, Engineer, or County of the substitution request does not mean that the Contractor is relieved of Contractor's responsibilities for Submittals, Shop Drawings, and schedules under Article 3.7 and 8.3.2 if the Contractor is awarded the Project.

Name of Bidder: \_\_\_\_\_

By: \_\_\_\_\_

County: \_\_\_\_\_

By: \_\_\_\_\_

**ACKNOWLEDGMENT OF BIDDING PRACTICES REGARDING INDEMNITY FORM**

TO: San Joaquin County Office of Education

RE: Project Number: 010-233-233000

Construction Contract for CodeStack Academy – 201 N. California St.

Please be advised that with respect to the above-referenced Project the undersigned Contractor on behalf of itself and all subcontractors hereby waives the benefits and protection of Labor Code section 3864, which provides:

“If an action as provided in this chapter is prosecuted by the employee, the employer, or both jointly against the third person results in judgment against such third person, the employer shall have no liability to reimburse or hold such third person harmless on such judgment or settlement in the absence of a written agreement to do so executed prior to the injury.”

This Agreement has been signed by an authorized representative of the contracting party and shall be binding upon its successors and assignees. The undersigned further agrees to promptly notify the County of any changes of ownership of the contracting party or any subcontractor while this Agreement is in force.

\_\_\_\_\_  
Contracting Party

\_\_\_\_\_  
Name of Agent/Title



**DISABLED VETERAN BUSINESS ENTERPRISE (DVBE) PARTICIPATION**  
**STATEMENT**

Each bidder must complete this form in order to comply with the San Joaquin County Office of Education (“County”) policy for participation of disabled veteran business enterprises (School County projects funded in whole or in part by the State of California pursuant to the Leroy F. Greene School Facilities Act of 1998. (Education Code §17070.10, *et seq.*)

Project Name: CodeStack Academy – 201 N. California St.

Bid No.: \_\_\_\_\_

Permit No.: \_\_\_\_\_

The undersigned, on behalf of the Contractor named below, certifies that the Contractor has made reasonable efforts to secure participation by DVBE in the Contract to be awarded for the above-referenced Bid No., including participation by DVBE subcontractors and/or material suppliers. **Check only one of the following:**

- The Contractor was unable after reasonable efforts to secure DVBE participation in the Contract for the above-referenced Project/Bid No. However, the Contractor will use DVBE services if the opportunity arises at any time during construction of the Project. Upon completion of the Project, the Contractor will report to the County the total dollar amount of DVBE participation in any Contract awarded to Contractor, and in any change orders, for the above-referenced Project.
  
- The Contractor has secured DVBE participation in the Contract for the above referenced Project/Bid No., and anticipates that such DVBE participation will equal approximately \_\_\_\_\_ dollars (\$ \_\_\_\_\_ ), which represents approximately \_\_\_\_\_ percent (\_\_\_%) of the total Contract for such Project. Upon completion of the Project, Contractor will report to the County the actual total dollar amount of DVBE participation in the Contract awarded to Contractor, and in any change orders, for such Project

Company: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## **CONTRACTOR'S CERTIFICATE REGARDING DRUG-FREE WORKPLACE**

This Drug-Free Workplace Certification form is required from all successful bidders pursuant to the requirements mandated by Government Code section 8350 et seq., the Drug-Free Workplace Act of 1990. The Drug-Free Workplace Act of 1990 requires that every person or organization awarded a contract or grant for the procurement of any property or service from any State agency must certify that it will provide a drug-free workplace by performing certain specified acts. In addition, the Act provides that each contract or grant awarded by a State agency may be subject to suspension of payments or termination of the contract or grant, and the Contractor or grantee may be subject to debarment from future contracting, if the contracting agency determines that specified acts have occurred.

Pursuant to Government Code section 8355, every person or organization awarded a contract or grant from a State agency shall certify that it will provide a drug-free workplace by doing all of the following:

1. 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.
2. Establishing a drug-free awareness program to inform employees about all of the following:
  - a. The dangers of drug abuse in the workplace;
  - b. The person's or organization's policy of maintaining a drug-free workplace;
  - c. The availability of drug counseling, rehabilitation and employee-assistance programs; and
  - d. The penalties that may be imposed upon employees for drug abuse violations;
3. Requiring that each employee engaged in the performance of the contract or grant be given a copy of the statement required by subdivision (a) and that, as a condition of employment on the contract or grant, the employee agrees to abide by the terms of the statement.

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

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

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

DATE: \_\_\_\_\_

CONTRACTOR

By: \_\_\_\_\_

Signature

**CONTRACTOR’S CERTIFICATE REGARDING ALCOHOLIC BEVERAGE AND  
TOBACCO-FREE CAMPUS POLICY**

The Contractor agrees that it will abide by and implement the County’s Alcoholic Beverage and Tobacco-Free Campus Policy, which prohibits the use of alcoholic beverages and tobacco products, of any kind and at any time, in County-owned or leased buildings, on COUNTY property and in COUNTY vehicles. The Contractor shall procure signs stating “ALCOHOLIC BEVERAGE AND TOBACCO USE IS PROHIBITED” and shall ensure that these signs are prominently displayed in all entrances to school property at all times.

DATE: \_\_\_\_\_

\_\_\_\_\_

CONTRACTOR

By: \_\_\_\_\_

Signature

[End of Bid Documents to be Submitted with Bid]

**AGREEMENT FORM**

**THIS AGREEMENT**, entered into this \_\_\_ day of \_\_\_\_\_, 20\_\_ in the County of San Joaquin of the State of California, by and between the San Joaquin County Office of Education, hereinafter called the “County”, and \_\_\_\_\_, hereinafter called the “Contractor”.

**WITNESSETH** that the County and the Contractor for the consideration stated herein agree as follows:

**ARTICLE 1 - SCOPE OF WORK:** The Contractor shall furnish all labor, materials, equipment, tools, and utility and transportation services, and perform and complete all work required in connection with CodeStack Academy – 201 N. California St. (“Project”) in strict accordance with the Contract Documents enumerated in Article 7 below. The Contractor shall be liable to the County for any damages arising as a result of a failure to comply with that obligation, and the Contractor shall not be excused with respect to any failure to so comply by an act or omission of the Architect, Engineer, Inspector, Agency Having Jurisdiction (AHJ), or representative of any of them, unless such act or omission actually prevents the Contractor from fully complying with the Contract Documents and the Contractor protests, in accordance with the Contract Documents, that the act or omission is preventing the Contractor from fully complying with the Contract Documents. Such protest shall not be effective unless reduced to writing and filed with the County office within seven (7) days of the date of occurrence of such act or omission preventing the Contractor from fully complying with the Contract Documents.

**ARTICLE 2 - TIME OF COMPLETION:** The County may give notice to proceed within ninety (90) days of the award of the bid by the County. Once the Contractor has received a notice to proceed, the Contractor shall reach Substantial Completion (See Article 1.1.46) of the Work within **Three Hundred Eighty (380) calendar days** from receipt of the Notice to Proceed. This shall be called Contract Time. (See Article 8.1.1). It is expressly understood that time is of the essence.

Contractor has thoroughly studied the Project and has satisfied itself that the time period for this Project was adequate for the timely and proper completion of the Project within each milestone and within the Contract time. Further, Contractor has included in the analysis of the time required for this Project, items set forth in General Conditions Article 8.3.2.1, Submittal Schedules, Rain Day Float, and Governmental Delay Float.

In the event that the County desires to postpone giving the notice to proceed beyond this ninety (90) day period, it is expressly understood that with reasonable notice to the Contractor, giving the notice to proceed may be postponed by the County. It is further expressly understood by the Contractor, that the Contractor shall not be entitled to any claim of additional compensation as a result of the County’s postponement of giving the notice to proceed.

If the Contractor believes that a postponement will cause hardship to it, the Contractor may terminate the Contract with written notice to the County within ten (10) days after receipt by the Contractor of the County’s notice of postponement. It is further understood by the Contractor that in the event that the Contractor terminates the Contract as a result of postponement by the County, the County shall only be obligated to pay the Contractor for the work performed by the Contractor at the time of notification of postponement. Should the Contractor terminate the Contract as a result of a notice of postponement, the County shall have the authority to award the Contract to the next lowest responsible bidder.

**ARTICLE 3 - LIQUIDATED DAMAGES:** It being impracticable and infeasible to determine the amount of actual damage, it is agreed that the Contractor will pay the County the sum of **One Thousand Five Hundred DOLLARS (\$1,500.00)** per calendar day for each and every day of delay beyond the Contract Time set forth in Article 2 of this Agreement (inclusive of Milestones that are critical on the critical path or noted as critical to the County) as liquidated damages and not as a penalty or forfeiture. In the event Liquidated Damages are not paid, the Contractor further agrees that the County may deduct such amount thereof from any money due or that may become due the Contractor under the Contract (See Article 9.6 and 2.2 of the General Conditions).

**ARTICLE 4 - CONTRACT PRICE:** The County shall pay to the Contractor as full consideration for the faithful performance of the Contract, subject to any additions or deductions as provided in the Contract Documents, the sum of \_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_), said sum being the total amount stipulated in the Bid Contractor submitted plus Owner Discretionary Allowance #1 of \$300,000. Payment shall be made as set forth in the General Conditions.

Should any Change Order result in an increase in the Contract Price, the cost of such Change Order shall be agreed to in advance by the Contractor and the County, subject to the monetary limitations set forth in Public Contract Code section 20118.4. In the event that the Contractor proceeds with a Change in work without an agreement between the County and Contractor regarding the cost of a Change Order, the Contractor waives any Claim of additional compensation for such additional work.

**ARTICLE 5 - HOLD HARMLESS AGREEMENT:** Contractor shall defend, indemnify and hold harmless County, Architect, Inspector, the State of California and their officers, employees, agents and independent contractors from all liabilities, claims, actions, liens, judgments, demands, damages, losses, costs or expenses of any kind arising from death, personal injury, property damage or other cause based or asserted upon any act, omission, or breach connected with or arising from the progress of Work or performance of service under this Agreement or the Contract Documents. As part of this indemnity, Contractor shall protect and defend, at its own expense, County, Architect, Construction Manager, Inspector, the State of California and their officers, employees, agents and independent contractors from any legal action including attorney's fees or other proceeding based upon such act, omission, breach or as otherwise required by this Article.

Furthermore, Contractor agrees to and does hereby defend, indemnify and hold harmless County, Architect, Construction Manager, Inspector, the State of California and their officers, employees, agents and independent contractors from every claim or demand made, and every liability, loss, damage, expense or attorney's fees of any nature whatsoever, which may be incurred by reason of:

(a) Liability for (1) death or bodily injury to persons; (2) damage or injury to, loss (including theft), or loss of use of, any property; (3) any failure or alleged failure to comply with any provision of law or the Contract Documents; or (4) any other loss, damage or expense, sustained by any person, firm or corporation or in connection with the Work called for in this Agreement or the Contract Documents, except for liability resulting from the sole or active negligence, or the willful misconduct of the County.

(b) Any bodily injury to or death of persons or damage to property caused by any act, omission or breach of Contractor or any person, firm or corporation employed by Contractor, either directly or by independent contract, including all damages or injury to or death of persons, loss (including theft) or loss of use of any property, sustained by any person, firm or corporation, including the County, arising out of or in any way connected with Work covered by this Agreement or the Contract Documents, whether said

injury or damage occurs either on or off County property, but not for any loss, injury, death or damages caused by the sole or active negligence or willful misconduct of the County.

(c) Any dispute between Contractor and Contractor's subcontractors/suppliers/ Sureties, including, but not limited to, any failure or alleged failure of the Contractor (or any person hired or employed directly or indirectly by the Contractor) to pay any Subcontractor or Materialman of any tier or any other person employed in connection with the Work and/or filing of any stop notice or mechanic's lien claims.

(d) Any claims, allegations, penalties, assessments, or liabilities to the extent caused by the Contractor's failure or the failure of any Subcontractor of any tier, to fully comply with the DIR registration requirements under Labor Code section 1725.5 at all times during the performance of any Work on the Project and shall reimburse the County for any penalties assessed against the County arising from any failure by the Contractor or any Subcontractor of any tier from complying with Labor Code sections 1725.5 and 1771.1. Nothing in this paragraph, however, shall require the Contractor or any Subcontractor to be liable to the County or indemnify the County for any penalties caused by the County in accordance with Labor Code section 1773.3 (g).

Contractor, at its own expense, cost, and risk, shall defend any and all claims, actions, suits, or other proceedings that may be brought or instituted against the County, its officers, agents or employees, on account of or founded upon any cause, damage, or injury identified herein Article 5 and shall pay or satisfy any judgment that may be rendered against the County, its officers, agents or employees in any action, suit or other proceedings as a result thereof.

The Contractor's and Subcontractors' obligation to defend, indemnify and hold harmless the Owner, Architect, Inspector, the State of California and their officers, employees, agents and independent contractors hereunder shall include, without limitation, any and all claims, damages, and costs for the following: (1) any damages or injury to or death of any person, and damage or injury to, loss (including theft), or loss of use of, any property; (2) breach of any warranty, express or implied; (3) failure of the Contractor or Subcontractors to comply with any applicable governmental law, rule, regulation, or other requirement; (4) products installed in or used in connection with the Work; and (5) any claims of violation of the Americans with Disabilities Act ("ADA").

**ARTICLE 6 - PROVISIONS REQUIRED BY LAW:** Each and every provision of law and clause required to be inserted in this Contract shall be deemed to be inserted herein, and this Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted or is not inserted correctly, then upon application of either party the Contract shall forthwith be physically amended to make such insertion or correction.

**ARTICLE 7 - COMPONENT PARTS OF THE CONTRACT:** The Contract entered into by this Agreement consists of the following Contract Documents, all of which are component parts of the Contract as if herein set out in full or attached hereto.

Notice Inviting Bids  
Instructions to Bidders  
Designation of Subcontractors  
Non-Collusion Declaration  
Bid Guarantee Form  
Bid Bond  
Bid Form



Contractor's Certificate Regarding Worker's Compensation  
Acknowledgment of Bidding Practices Regarding Indemnity  
DVBE Participation Statement and Close-Out Forms  
Agreement Form  
Payment Bond  
Performance Bond  
Guarantee  
Escrow Agreement for Security Deposit In Lieu of Retention  
Workers' Compensation/Employers Liability Endorsement  
General Liability Endorsement  
Automobile Liability Endorsement  
Contractor's Certificate Regarding Drug-Free Workplace  
Contractor's Certificate Regarding Alcohol and Tobacco  
Contractor's Certificate Regarding Background Checks  
General Conditions  
Supplementary and Special Conditions  
Specifications  
All Addenda as Issued  
Drawings/Plans  
Substitution Request Form  
Requirements, Reports and/or Documents in the Project Manual or Other Documents Issued to Bidders

All of the above named Contract Documents are intended to be complementary. Work required by one of the above named Contract Documents and not by others shall be done as if required by all.

**ARTICLE 8 - PREVAILING WAGES:** Wage rates for this Project shall be in accordance with the general prevailing rate of holiday and overtime work in the locality in which the work is to be performed for each craft, classification, or type of work needed to execute the Contract as determined by the Director of the Department of Industrial Relations. Copies of schedules of rates so determined by the Director of the Department of Industrial Relations are on file at the administrative office of the County and are also available from the Director of the Department of Industrial Relations. Monitoring and enforcement of the prevailing wage laws and related requirements will be performed by the Labor Commissioner/ Department of Labor Standards Enforcement (DLSE).

The following are hereby referenced and made a part of this Agreement and Contractor stipulates to the provisions contained therein.

1. Chapter 1 of Part 7 of Division 2 of the Labor Code (Section 1720 et seq.)
2. California Code of Regulations, Title 8, Chapter 8, Subchapters 3 through 6 (Section 16000 et seq.)

**ARTICLE 9 - RECORD AUDIT:** In accordance with Government Code section 8546.7 (and Davis Bacon, if applicable) and Article 13.11 of the General Conditions, records of both the County and the Contractor shall be subject to examination and audit for a period of five (5) years after a Final Retention Payment or the Recording of a Notice of Completion, whichever occurs first.

**ARTICLE 10 - CONTRACTOR'S LICENSE:** The Contractor must possess throughout the Project a Class B Contractor's License, issued by the State of California, which must be current and in good standing.

**IN WITNESS WHEREOF**, this Agreement has been duly executed by the above named parties, on the day and year first above written.

San Joaquin County Office of Education

CONTRACTOR:

By: \_\_\_\_\_

\_\_\_\_\_  
Typed or Printed Name

By: \_\_\_\_\_  
Purchasing and Contracts Director

\_\_\_\_\_  
Title

Dated: \_\_\_\_\_

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Type or Printed Name

\_\_\_\_\_  
Title (Authorized Officers or Agents)

\_\_\_\_\_  
Signature

**(CORPORATE SEAL)**

**PAYMENT BOND**

**(CALIFORNIA PUBLIC WORK)**

KNOW ALL MEN BY THESE PRESENTS:

THAT WHEREAS, the San Joaquin County Office of Education (sometimes referred to hereinafter as “Obligee”) has awarded to \_\_\_\_\_ (hereinafter designated as the “Principal” or “Contractor”), an agreement for the work described as follows:

CodeStack Academy – 201 N. California St. (hereinafter referred to as the “Public Work”); and

WHEREAS, said Contractor is required to furnish a bond in connection with said Contract, and pursuant to California Civil Code section 9550;

NOW, THEREFORE, We, \_\_\_\_\_, the undersigned Contractor, as Principal; and \_\_\_\_\_, a corporation organized and existing under the laws of the State of California, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the San Joaquin County Office of Education and to any and all persons, companies, or corporations entitled by law to file stop notices under California Civil Code section 9100, or any person, company, or corporation entitled to make a claim on this bond, in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), such sum being not less than one hundred percent (100%) of the total amount payable by said Obligee under the terms of said Contract, for which payment will and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, its heirs, executors, administrators, successors, or assigns, or subcontractor, shall fail to pay any person or persons named in Civil Code section 9100; or fail to pay for any materials, provisions, 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 Unemployment Insurance Code section 13020 with respect to work and labor thereon of any kind, then said Surety will pay for the same, in an amount not exceeding the amount herein above set forth, and in the event suit is brought upon this bond, also will pay such reasonable attorneys’ fees as shall be fixed by the court, awarded and taxed as provided in California Civil Code section 9550 et seq.

This bond shall inure to the benefit of any person named in Civil Code section 9100 giving such person or his/her assigns a right of action 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, or specifications, or agreement pertaining or relating to any scheme or work of improvement herein above described; 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 time for payment pertaining or relating to any scheme or work of improvement herein above described; 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 the Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the Obligee and the Contractor or on the part of any obligee named in such bond; that the sole condition of recovery shall be that the claimant is a person described in California Civil Code section 9100, and who has not been paid the full amount of his or her claim; and that the Surety does hereby waive notice of any such change, extension of time, addition, alteration or modification herein mentioned.

IN WITNESS WHEREOF this instrument has been duly executed by the Principal and Surety above named, on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

PRINCIPAL/CONTRACTOR:

\_\_\_\_\_

By: \_\_\_\_\_

SURETY:

\_\_\_\_\_

By: \_\_\_\_\_

Attorney-in-Fact

IMPORTANT: THIS IS A REQUIRED FORM.

Surety companies executing bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in California Insurance Code section 105, and if the work or project is financed, in whole or in part, with federal, grant or loan funds, Surety's name must also appear on the Treasury Department's most current list (Circular 570 as amended).

Any claims under this bond may be addressed to:

(Name and Address of Surety)

(Name and Address of agent or representative for service for service of process in California)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Telephone: \_\_\_\_\_

Telephone: \_\_\_\_\_

A notary public or other office completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA )  
 ) ss.  
COUNTY OF )

On \_\_\_\_\_, before me, \_\_\_\_\_, personally appeared \_\_\_\_\_, who proved on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies) as the Attorney-in-Fact of \_\_\_\_\_ (Surety) and acknowledged to me that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

\_\_\_\_\_  
Notary Public in and for said State

(SEAL)

Commission expires: \_\_\_\_\_

NOTE: A copy of the power-of-attorney to local representatives of the bonding company must be attached hereto.

**PERFORMANCE BOND**  
**(CALIFORNIA PUBLIC WORK)**

KNOW ALL MEN BY THESE PRESENTS:

THAT WHEREAS, the San Joaquin County Office of Education (sometimes referred to hereinafter as “Obligee”) has awarded to \_\_\_\_\_ (hereinafter designated as the “Principal” or “Contractor”), an agreement for the work described as follows: CodeStack Academy – 201 N. California St. (hereinafter referred to as the “Public Work”); and

WHEREAS, the work to be performed by the Contractor is more particularly set forth in that certain contract for said Public Work dated \_\_\_\_\_, (hereinafter referred to as the “Contract”), which Contract is incorporated herein by this reference; and

WHEREAS, the Contractor is required by said Contract to perform the terms thereof and to provide a bond both for the performance and guaranty thereof.

NOW, THEREFORE, we, \_\_\_\_\_, the undersigned Contractor, as Principal, and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the San Joaquin County Office of Education in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), said sum being not less than one hundred percent (100%) of the total amount payable by said Obligee under the terms of said Contract, for which amount 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 bounded Contractor, his or her heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in said Contract and any alteration thereof made as therein provided, on his or her part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill guarantees of all materials and workmanship; and indemnify, defend and save harmless the Obligee, its officers and agents, as stipulated in said Contract, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

The Surety, for value received, hereby stipulates and agrees that it shall not be exonerated or released from the obligation of this bond (either by total exoneration or pro tanto) by any change, extension of time, alteration in or addition to the terms of the contract or to the work to be performed there under or the specifications accompanying the same, nor by any change or modification to any terms of payment or extension of time for any payment pertaining or relating to any scheme of work of improvement under the contract. Surety also stipulates and agrees that it shall not be exonerated or released from the obligation of this bond (either by total exoneration or pro tanto) by any overpayment or underpayment by the Obligee that is based upon estimates approved by the Architect. The Surety stipulates and agrees that none of the aforementioned changes, modifications, alterations, additions, extension of time or actions shall in any way affect its obligation on this bond, and it does hereby waive notice of any such changes, modifications,

alterations, additions or extension of time to the terms of the contract, or to the work, or the specifications as well notice of any other actions that result in the foregoing.

Whenever Principal shall be, and is declared by the Obligees to be, in default under the Contract, the Surety shall promptly either remedy the default, or shall promptly take over and complete the Contract through its agents or independent contractors, subject to acceptance and approval of such agents or independent contractors by Obligees as hereinafter set forth, in accordance with its terms and conditions and to pay and perform all obligations of Principal under the Contract, including, without limitation, all obligations with respect to warranties, guarantees and the payment of Liquidated Damages; or, at Obligees' sole discretion and election, Surety shall obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by Obligees of the lowest responsible bidder, arrange for a contract between such bidder and the Obligees and make available as Work progresses (even though there should be a default or succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the "balance of the Contract Price" (as hereinafter defined), and to pay and perform all obligations of Principal under the Contract, including, without limitation, all obligations with respect to warranties, guarantees and the payment of Liquidated Damages. The term "balance of the Contract Price," as used in this paragraph, shall mean the total amount payable to Principal by the Obligees under the Contract and any modifications thereto, less the amount previously paid by the Obligees to the Principal, less any withholdings by the Obligees allowed under the Contract. Obligees shall not be required or obligated to accept a tender of a completion contractor from the Surety.

Surety expressly agrees that the Obligees may reject any agent or contractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Principal. Unless otherwise agreed by Obligees, in its sole discretion, Surety shall not utilize Principal in completing the Contract nor shall Surety accept a bid from Principal for completion of the work in the event of default by the Principal.

No final settlement between the Obligees and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

The Surety shall remain responsible and liable for all patent and latent defects that arise out of or relate to the Contractor's failure and/or inability to properly complete the Public Work as required by the Contract and the Contract Documents. The obligation of the Surety hereunder shall continue so long as any obligation of the Contractor remains.

Contractor and Surety agree that if the Obligees is required to engage the services of an attorney in connection with enforcement of the bond, Contractor and Surety shall pay Obligees' reasonable attorneys' fees incurred, with or without suit, in addition to the above sum.

In the event suit is brought upon this bond by the Obligees and judgment is recovered, the Surety shall pay all costs incurred by the Obligees in such suit, including reasonable attorneys' fees to be fixed by the Court.



IN WITNESS WHEREOF, we have hereunto set our hands and seals this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

PRINCIPAL/CONTRACTOR:

\_\_\_\_\_

By: \_\_\_\_\_

SURETY:

\_\_\_\_\_

By: \_\_\_\_\_

Attorney-in-Fact

The rate of premium on this bond is \_\_\_\_\_ per thousand.

The total amount of premium charged: \$ \_\_\_\_\_ (This must be filled in by a corporate surety).

**IMPORTANT: THIS IS A REQUIRED FORM.**

Surety companies executing bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in California Insurance Code section 105, and if the work or project is financed, in whole or in part, with federal, grant or loan funds, Surety's name must also appear on the Treasury Department's most current list (Circular 570 as amended).

Any claims under this bond may be addressed to:

(Name and Address of Surety)

(Name and Address of agent or representative for service for service of process in California)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Telephone: \_\_\_\_\_

Telephone: \_\_\_\_\_



**GUARANTEE**

Guarantee for \_\_\_\_\_ . We hereby guarantee that the \_\_\_\_\_, which we have installed in \_\_\_\_\_ has been done in accordance with the Contract Documents, including without limitation, the drawings and specifications, and that the work as installed will fulfill the requirements included in the bid documents. The undersigned and its surety agrees to repair or replace any or all such work, together with any other adjacent work, which may be displaced in connection with such replacement, that may prove to be defective in workmanship or material within a period of **One (1) year** from the date of the Notice of Completion of the above-mentioned structure by the San Joaquin County Office of Education, ordinary wear and tear and unusual abuse or neglect excepted.

In the event the undersigned or its surety fails to comply with the above-mentioned conditions within a reasonable period of time, as determined by the County, but not later than ten (10) days after being notified in writing by the County or within forty eight (48) hours in the case of an emergency or urgent matter, the undersigned and its surety authorizes the County to proceed to have said defects repaired and made good at the expense of the undersigned and its surety, who will pay the costs and charges therefor upon demand. The undersigned and its surety shall be jointly and severally liable for any costs arising from the County's enforcement of this Guarantee.

Countersigned

\_\_\_\_\_  
(Proper Name)

\_\_\_\_\_  
(Proper Name)

By: \_\_\_\_\_

By: \_\_\_\_\_

\_\_\_\_\_  
(Signature of Subcontractor or Contractor)

\_\_\_\_\_  
(Signature of General Contractor if for Subcontractor)

Representatives to be contacted for service:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Phone Number: \_\_\_\_\_

## ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between the San Joaquin County Office of Education, 2922 Transworld Drive, Stockton, CA 95206, hereinafter called "Owner", and \_\_\_\_\_ whose address is \_\_\_\_\_, hereinafter called "Contractor", and \_\_\_\_\_ whose address is \_\_\_\_\_, hereinafter called "Escrow Agent".

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

1. Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for Retention earnings required to be withheld by Owner pursuant to the Construction Contract entered into between the Owner and Contractor for \_\_\_\_\_ in the amount of \_\_\_\_\_ dated \_\_\_\_\_ (hereinafter referred to as the "Contract"). Alternatively, on written request of the Contractor, the Owner shall make payments of the Retention earnings directly to the escrow agent. When Contractor deposits the securities as a substitute for Contract earnings, the Escrow Agent shall notify the Owner within ten (10) days of 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 Contract between the Owner and Contractor. Securities shall be held in the name of the Owner, and shall designate the Contractor as beneficial owner.
2. The Owner shall make progress payments to the Contractor for such funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above.
3. When the Owner makes payments of Retentions earned directly to the Escrow Agent, the Escrow Agent shall hold them for the benefit of the Contractor until such time as the escrow created under this Contract is terminated. The Contractor may direct the investment of the payments into securities. All terms and conditions of this Agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the 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 the Owner. These expenses and payment terms shall be determined by the Owner, Contractor, and Escrow Agent.
5. The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to the Owner.
6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from the Owner to the Escrow Agent that Owner consents to the withdrawal of the amount sought to be withdrawn by Contractor.
7. The Owner shall have a right to draw upon the securities in the event of default by the Contractor. Upon seven (7) days' written notice to the Escrow Agent from the Owner of the notice of default under Article 2.2, Article 9.6 or Article 14, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by the Owner.

8. Upon receipt of written notification from the Owner certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payment of fees and charges.

9. Escrow Agent shall rely on the written notifications from the Owner and the Contractor pursuant to Sections (5) to (8), inclusive, of this Agreement and the Owner and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

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

On behalf of Owner:

---

Title

---

Name

---

Signature

---

Address

On behalf of Contractor:

---

Title

---

Name

---

Signature

---

Address

On behalf of Agent:

\_\_\_\_\_
Title

\_\_\_\_\_
Name

\_\_\_\_\_
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 Agreement.

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

OWNER

CONTRACTOR

\_\_\_\_\_
Title

\_\_\_\_\_
Title

\_\_\_\_\_
Name

\_\_\_\_\_
Name

\_\_\_\_\_
Signature

\_\_\_\_\_
Signature

**INSURANCE DOCUMENTS & ENDORSEMENTS**

The following insurance endorsements and documents must be provided to the San Joaquin County Office of Education County within five (5) calendar days after receipt of notification of award. If the apparent low bidder fails to provide the documents required below, the County may award the Contract to the next lowest responsible and responsive bidder or release all bidders, and the bidder’s bid security will be forfeited. All insurance provided by the bidder shall fully comply with the requirements set forth in Article 11 of the General Conditions.

1. **General Liability Insurance:** Certificate of Insurance with all specific insurance coverages set forth in Article 11 of the General Conditions, proper Project description, designation of the County as the Certificate Holder, a statement that the insurance provided is primary to any insurance obtained by the County and minimum of 30 days’ cancellation notice. Bidder shall also provide required additional insured endorsement(s) designating all parties required in Article 11 of the General Conditions. The additional insured endorsement shall be an ISO CG 20 10 (04/13), or an ISO CG 20 38 (04/13), or their equivalent as determined by the County in its sole discretion.

Incidents and claims are to be reported to the insurer at:

Attn: \_\_\_\_\_  
(Title) (Department)

\_\_\_\_\_  
(Company)

\_\_\_\_\_  
(Street Address)

\_\_\_\_\_  
(City) (State) (Zip Code)

(\_\_\_\_\_) \_\_\_\_\_  
(Telephone Number)

2. **Workers’ Compensation/ Employer’s Liability Insurance:** Certificate of Workers’ Compensation Insurance meeting the coverages and requirements set forth in Article 11 of the General Conditions, minimum of 30 days’ cancellation notice, proper Project description, waiver of subrogation and any applicable endorsements.

3. Automobile Liability Insurance: Certificate of Automobile Insurance meeting the coverages and requirements set forth in Article 11 of the General Conditions, minimum 30 days' cancellation notice, any applicable endorsements and a statement that the insurance provided is primary to any insurance obtained by the County.

Incidents and claims are to be reported to the insurer at:

Attn: \_\_\_\_\_  
(Title) (Department)

\_\_\_\_\_  
(Company)

\_\_\_\_\_  
(Street Address)

\_\_\_\_\_  
(City) (State) (Zip Code)

(\_\_\_\_\_) \_\_\_\_\_  
(Telephone Number)

DATE: \_\_\_\_\_ CONTRACTOR \_\_\_\_\_



By: \_\_\_\_\_

Signature

**DISABLED VETERAN BUSINESS ENTERPRISE (DVBE) CONTRACTOR CLOSE-OUT STATEMENT**

The Contractor shall complete this form, as a condition to Final Payment, for purposes of reporting participation by Disabled Veteran Business Enterprises (DVBE) in the Contract for the Project/Bid No. specified below.

Project Name: CodeStack Academy – 201 N. California St.

Bid No.: \_\_\_\_\_

Permit No.: \_\_\_\_\_

Name	Address/Phone	Category of Work*	\$ Amount of Contract

\* Categories of work include: (1) construction services (specify services that DVBE will provide); (2) architecture and engineering services; (3) procurement of materials, supplies and equipment; and (4) information technology.

The undersigned, on behalf of the Contractor, certifies that DVBE participation on the Contract for Bid No. \_\_\_\_\_ equaled \_\_\_\_\_ dollars (\$ \_\_\_\_\_), which represents approximately \_\_\_\_\_ percent (\_\_\_\_%) of the total Contract price including change orders for the Project.

Company: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

**CONTRACTOR CERTIFICATION REGARDING BACKGROUND CHECKS**

**(Modernization Projects)**

\_\_\_\_\_ certifies that it has performed one of the following:  
[Name of contractor/consultant]

- Pursuant to Education Code section 45125.1, Contractor has conducted criminal background checks, through the California Department of Justice, of all employees providing services to the \_\_\_\_\_ County, pursuant to the contract/purchase order dated \_\_\_\_\_, and that none have been convicted of serious or violent felonies, as specified in Penal Code sections 1192.7(c) and 667.5(c), respectively.

As further required by Education Code section 45125.1, attached hereto as Attachment “A” is a list of the names of the employees of the undersigned who may come in contact with pupils.

OR

- Pursuant to Education Code section 45125.2, Contractor will ensure the safety of pupils by one or more of the following methods:
  - 1. The installation of a physical barrier at the worksite to limit contact with pupils.
  - 2. Continual supervision and monitoring of all employees of the entity by an employee of the entity whom the Department of Justice has ascertained has not been convicted of a violent or serious felony.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Date \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
[Name of Contractor/Consultant]

\_\_\_\_\_  
By its: \_\_\_\_\_

**ATTACHMENT A:**

**CONTRACTOR CERTIFICATION REGARDING BACKGROUND CHECKS**

*(INSERT NAMES OF EMPLOYEES WHO MAY COME IN CONTACT WITH PUPILS)*

# GENERAL CONDITIONS

## **ARTICLE 1 DEFINITIONS**

### **1.1 BASIC DEFINITIONS**

1.1.1 Action is action of the Superintendent of the County.

1.1.2 Approval means written authorization through action of the Superintendent. The Superintendent has delegated to the Assistant Superintendent the authority to approve certain modifications, Change Orders or Immediate Change Directives (Subject to the limits of the Delegation of Authority provided by the Superintendent). In no case shall the Assistant Superintendent have authority to approve total Change Orders or Modifications to the Project exceeding 10% of the Contract Sum.

1.1.3 Architect means the architect, engineer, or other design professional engaged by the County to design and perform general observation of the work of construction and interpret the Drawings and Specifications for the Project. (See ARTICLE 4)

1.1.4 As-Builts are a set of Plans and Specifications maintained by the Contractor clearly showing all changes, revisions, substitutions, field changes, final locations, and other significant features of the Project. The As-Builts shall be maintained continuously throughout the Work for the Project and is both a prerequisite to the issuance of Payment Application and a requirement for Contract Close-Out. (See Article 3.17)

1.1.5 Beneficial Occupancy is the point in time when a building or buildings are fit for occupancy is fit for occupancy and its intended use. Basic requirements are the building is safe, at or near Substantial Completion, and all fire/ life safety items are approved and operational. The fact that a building is occupied does not mean that the building is ready for Beneficial Occupancy if there are elements that are unsafe or if fire/ life safety items are not approved and operational. Taking occupancy on a structure that is under a fire watch is not considered beneficial occupancy. Further, taking of Beneficial Occupancy is not a point in time when retention is due unless the entire school has obtained a Certificate of Substantial Completion that meets the definition of 1.1.46.

1.1.6 Claims. A Claim is a request for payment, supported by back-up documentation which includes, invoices time sheets, or other documents substantiating legitimacy or entitlement that is submitted during the Project or immediately following the Project made prior to the Final Retention Payment Application and prior to Final Completion of the Project. A “Claim” means a separate demand by the Contractor for (1) time extension, (2) payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the CONTRACT and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (3) and amount the payment of which is disputed by the County. (See Article 4.6)

1.1.7 Change Order (CO). A CO is a written instrument prepared by the Architect and signed by the County (as authorized by the County’s Superintendent), the Contractor, and the Architect, stating their agreement upon (1) A description of a change

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in the Work, (2) The amount of the adjustment in the Contract Sum, if any; and (3) The extent of the adjustment in the Contract Time, if any. (See Article 7.2)

1.1.8 Change Order Request (COR). A COR is a written request supported by backup documentation prepared by the Contractor requesting that the County and the Architect issue a CO based upon a proposed change, or a change that results in an adjustment in cost, time or both, or arising from an RFP, CCD or ICD. (See Article 7.6)

1.1.9 Close-Out means the process for Final Completion of the Project. (See Article 9.9)

1.1.10 Construction Change Document (CCD). A Construction Change Directive that is utilized to address changes to the AHJ approved Plans and Specifications that affect either the timing of the project, the cost of the project, or both. (See Article 7.3)

1.1.11 Complete/ Completion/ Final Completion means that all Work in the Contract Documents is finished, the requirements of the Contract Documents have been met, the Project has been Closed Out, and all Work has ceased on the Project. This may also be referred to as Final Completion. In most cases, the recording of a Notice of Completion shall represent Completion of the Project. Beneficial Occupancy does not mean the Work is Complete.

1.1.12 Completion Date is the date when all Work for the Project shall be Substantially Complete and is the date assigned at the end of the Contract Time for the Project. (See Article 1.1.44)

1.1.13 Construction Manager. The Construction Manager is a consultant to the County contracted to assist in Project planning, management and construction of the Project. If there is a Construction Manager, they may assist in various aspects of the Project including, but not limited to Monitoring the progress of the construction, reviewing and monitoring the schedule, progress of work, monitoring pay requests, facilitating communications, advising the County and its Superintendent on various aspects of the construction process, monitoring the RFI, COR, CCD, ICD, RFP, Claims, Disputes and other Project related processes.

1.1.14 Contract or Agreement when the terms are used in these General Conditions shall be references to the Contract Documents as defined herein.

1.1.15 Contract Documents (sometimes referred to as Construction Documents) consist of the Agreement between County and Contractor (hereinafter the Agreement or Contract), Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to bid, instructions to bidders, notice to bidders, and the requirements contained in the Bid Documents, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is a written amendment to the Contract signed by parties, a Change Order, a Construction Change Document, or a written order for a minor change in the Work issued by the Architect. The Contract Documents collectively form the Contract. The Contract represents the entire and integrated Agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may

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be amended or modified only by a written Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between the Architect and Contractor, between the County and any Subcontractor or Sub-subcontractor, or between any persons or entities other than the County and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

1.1.16 Contract Time is the time period specified in the Contract Documents in which the Project shall be completed. This is sometimes referred to a Contract Duration, or "time in which the Contractor has to complete the Project". (See Article 8.1.1)

1.1.17 Contractor, County, and Architect are those mentioned as such in the Agreement. They are treated throughout the Contract Documents as if they are of singular number and neuter gender. Any reference to "Owner" shall mean "County" or San Joaquin County Office of Education.

1.1.18 Cure is the act of remedying a material failure to perform under the terms of the Contract Documents during the time provided to correct Contractor's Default. Specific time periods are provided to Cure and Correct a Contractor Default under Article 14 and for a Partial Default under Article 2.2 as well as elsewhere in the Contract Documents.

1.1.19 Days mean calendar days unless otherwise specifically stated.

1.1.20 Default is a material breach of Contract. A Termination for Cause under Article 14 is a declaration of Default of the Contract and shall act as a demand upon the Surety to perform under the terms of the Performance Bond. Partial Defaults may also be tendered to the Surety at County's discretion. (See Article 2.2)

1.1.21 Dispute. A dispute is a disagreement on terms or conditions of the Project where the Contractor's opinion of the Project, Payment, Change Order or Request for Proposal differs from that of the County or Architect. A dispute only rises to the level of a claim once the dispute is assembled with back-up documentation and presented for evaluation. (See Article 4.6)

1.1.22 County Representative is the person designated by the County to represent the County during the Construction for the Project. This County Representative shall have the delegated authority as further defined in Article 1.1.2. This County Representative may be an employee of the County who may have the delegated authority as set forth in Article 1.1.3, and may also include Construction Managers. In some cases, the County and its Superintendent may be assisted by a Construction Manager. When a Construction Manager is assisting the County, the Contractor, Architect, and Inspector shall have a primary contact with the County's Construction Manager who will advise the County.

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

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Architect. Sometimes Drawings will also be included in Addenda, Change Orders, and Specifications.

1.1.24 Emergency shall be defined as a sudden, unexpected occurrence, involving a clear and imminent threat to the continuation of school classes, a critical path delay that will result in not being able to occupy the school when students arrive to use the facility, danger from the facility or from outside the facility, Act of God, or other action which requires immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services.

1.1.25 Float the total number of days an activity may be extended or delayed without delaying the Completion Date shown in the schedule. Float will fall into three categories: (1) Rain Days; (2) Governmental Delays; and, (3) Project Float. (See Article 8.1.4)

1.1.26 Immediate Change Directive. (ICD) A written order prepared by the Architect and signed by the County and the Architect, directing a change in the Work where the Work must proceed immediately and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. (See Article 7.3)

1.1.27 Project Inspector (PI) is the individual retained by the County who will be assigned to the Project

1.1.28 Payment Application or Certificate of Payment is the Contractor's certified representation of the actual level of Work performed on the Project. Payment Applications are sometimes also called "Certificate of Payment", "Request for Payment", "Payment Application", or similar terms, and shall follow the Schedule of Values that are approved by the Architect, Inspector and County. (See Article 9.3)

1.1.29 Project is the complete construction of the Work performed in accordance with the Contract Documents.

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

1.1.31 Provide shall include "provide complete in place," that is "furnish and install complete."

1.1.32 Punch List/ Punch Item/ Incomplete Punch Item is a list of minor repair items, prepared after the issuance of a Certificate of Substantial Completion, by the Inspector and Architect of Work required in order to complete the Contract Documents and ensure compliance with the permitted plans so the Project may be Closed Out. Issuance of the Retention Payment is dependent on the proper completion of the Punch List. (See Article 9.9)

1.1.32.1 *Contractor's List of Punch Items* is a list of minor repair items the Contractor submits when the Contractor considers the Work Substantially Complete. Submission of this List of Incomplete Punch Items is the Contractor's representation that the Project is Substantially Complete. (See Article 9.9.1.1)



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1.1.33 Request for Information (RFI) is a written request prepared by the Contractor requesting the Architect to provide additional information necessary to clarify or amplify an item which the Contractor believes is not clearly shown or called for in the Drawings or Specifications, or to address problems which have arisen under field conditions. (See Article 7.4)

1.1.34 Request for Proposal (RFP) is a written request prepared by the Architect (and/or CM) requesting the Contractor to submit to an estimate of the effect of a proposed change on the Contract Price and (if applicable) the Contract Time. (See Article 7.5)

1.1.35 Safety Orders are those issued by any city, county, state or federal agency having jurisdiction over the Project.

1.1.36 Schedule is the Contractor's view of the practical way in which the Work will be accomplished. In this Agreement there is a requirement for a Baseline Schedule and regular Schedule Updates that show all Work to be completed during the Contract Time and shall include all items listed under Article 8.3.2.9. See Article 8 of the General Conditions.

1.1.37 Schedule of Values is a detailed breakdown of the Contract Price for each Project, building, Phase of Work or Site as determined by the County. This Schedule of Values shall adequately detail the price for the Work so Progress Payments Applications can be meaningfully reviewed by the Inspector, Architect of Record, Engineer of Record, and County. (See Article 9.2)

1.1.38 Separate Contracts are Contracts that the County may have with other Contractors, vendors, suppliers, or entities to perform Work on the Project. This may include, but is not limited to Multi-Prime Trade Contractors, furniture installers, testing agencies, clean-up contractors, or network or low voltage contractors. Contractor shall plan for certain other contractors that may also be working on the Project site and address these other contractors in Contractor's Schedule. (See Article 6)

1.1.39 Site refers to the grounds of the Project as defined in the Contract Documents and such adjacent lands as may be directly affected by the performance of the Work.

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

1.1.41 Standards, Rules, and Regulations referred to are recognized printed standards and shall be considered as one and a part of these Specifications within limits specified. Federal, state and local regulations are incorporated into the Contract Documents by reference.

1.1.42 Stop Work Order, or an Order to Comply, is issued when either (1) the Work proceeds without AHJ approval; (2) the Work proceeds without a Project Inspector (PI), or (3) where the AHJ determines that the Work is not being performed in accordance with applicable rules and regulations, and would compromise the structural integrity of the

## GENERAL CONDITIONS

Project or would endanger lives. If a Stop Work Order is issued, the Work in the affected area shall cease until the AHJ withdraws the Stop Work Order. Pursuant to Education Code section 17307.5(b), the County shall not be held liable in any action filed against the County for any delays caused by compliance with the Stop Work Order

1.1.43 Subcontractor, as used herein, includes those having direct or indirect contracts with Contractor and ones who furnished labor, material or services for a special design according to Plans, Drawings, and Specifications of this Work.

1.1.44 Substantial Completion/ Substantially Complete(d) is not reached unless and until each of the following four (4) conditions have been met: (1) all contractually required items have been installed with the exception of only minor and Incomplete Punch List Items (See Article 9.9.1.2 ); (2) All Fire/Life Safety Systems have been installed, and are working, and all building systems including mechanical, electrical and plumbing are all functioning; (3) the Project is fit for occupancy and its intended use. For the purposes of this Contract, any references to Completion Date means Substantial Completion Date.

1.1.45 Substitution is a change in product, material, equipment, or method of construction from those required by the Construction Documents proposed by the Contractor. For this Project, a Substitution is subject to the filing of a Construction Substitution Request Form at the time of bid and meeting the requirements of Article 3.10.

1.1.46 Supplementary Conditions/ Supplementary General Conditions/ Special Conditions are terms that are sometimes used interchangeably and refer to any additional requirements or changes to the General Conditions as noted.

1.1.47 Surety is the person, firm, or corporation that executes as a bid bond, Payment Bond or Performance Bond guarantor on the Contractor's Bid, Contractor's Performance on the Contract and Payment of the Contractor's Subcontractors, material suppliers, vendors and labor on the Project. The Surety is bound to the same extent as the Contractor is bound once a Default occurs. A default includes a Termination for Substantial Failure to Perform under Article 14, but also includes any breach of Contract and is subject to the requirements and responsibilities as set forth in the Performance Bond.

1.1.48 Work shall include all labor, materials, services and equipment necessary for the Contractor to fulfill all of its obligations pursuant to the Contract Documents. It shall include the initial obligation of any Contractor or Subcontractor who performs any portion of the Work, to visit the Site of the proposed Work (a continuing obligation after the commencement of the Work), to fully acquaint and familiarize itself with the conditions as they exist and the character of the operations to be carried out under the Contract Documents, and make such investigation as it may see fit so that it shall fully understand the facilities, physical conditions, and restrictions attending the Work under the Contract Documents. Each such Contractor and its Subcontractors shall also thoroughly examine and become familiar with the Drawings, Specifications, and associated Contract Documents and bid documents before preparing and submitting any bid.

1.1.49 Workers include laborers, workers, and mechanics.

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## **1.2 EXECUTION, CORRELATION AND INTENT**

### **1.2.1 Correlation and Intent**

1.2.1.1 *Documents Complementary and Inclusive.* The Contract Documents are complementary and are intended to include all items required for the proper execution and completion of the Work. All Contract Documents form the Contractor's Contract with the County. Any item of Work mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, shall be provided by Contractor as if shown or mentioned in both. The Contractor is bound to provide the Work complete and is under a legal duty to carefully study Plans and schedule operations well ahead of time and identify inconsistencies with the Plans and Specifications and call such inconsistencies to the attention of the Architect or Registered Engineer through the Inspector under Section 4-343(b) of Title 24.

1.2.1.2 *Work to be Complete.* Contractor has thoroughly studied the Contract Documents and understands that the County contracted with Contractor to provide a complete Project which means complete systems and buildings. The entire set of Contract Documents shows a complete Project and Contractor agrees that there are multiple disciplines putting together a set of Contract Documents. Thus, if portions of a system are shown on some Drawings and not others, this does not mean the Contractor is to only provide part of a system. For example, if an air conditioning unit is shown on the mechanical Drawings, the plumbing for the air conditioning is shown on another Drawing, and the electrical shown on the electrical Drawings, the Contractor is to provide a complete and working air conditioning system. The only time when an item is supplied incomplete is if the system is shown specifically as incomplete since others will be completing the system. Work includes, but is not limited to materials, workmanship, and manufacture of fabrication of components for the Project.

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

1.2.1.4 *Conflicts.* In the event there is a discrepancy between the various Contract Documents, it is intended that the more stringent, higher quality, and greater quantity of Work shall apply.

1.2.1.5 *Conformance with Laws.* Each and every provision of law required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein, even if through mistake or otherwise any such provision is not inserted, or is not correctly inserted.

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

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affecting the construction and operation of the physical plant of the Project, all quasi-governmental and other regulations affecting the construction and operation of the physical plant of the Project, and other special requirements, if any, designated in the Contract Documents. Such checking shall include review of Title 24 of the California Code of Regulations, California Building Code, local utility, local water connection, local grading and all other applicable agencies. In the event Contractor observes any violation of any law, ordinance, code, rule or regulation, or inconsistency with the Contract Documents, Contractor shall, within five (5) days, notify the Inspector, Architect and County in writing of same and shall ensure that any such violation or inconsistency shall be corrected in the manner provided hereunder prior to the construction of that portion of the Project.

The Contractor shall bear all expenses of correcting Work done contrary to said laws, ordinances, rules, and regulations if the Contractor performed same (1) without first consulting the Architect for further instructions regarding said Work or (2) disregarded the Architect's instructions regarding said Work.

1.2.1.6 *Ambiguity and Inconsistency.* Before commencing any portion of the Work, Contractor shall carefully examine all Drawings and Specifications and other information given to Contractor as to materials and methods of construction and other Project requirements. Prior to commencing any portion of the Work, Contractor shall notify Architect and County in writing of any perceived or alleged error, inconsistency, conflict, ambiguity, or lack of detail or explanation in the Drawings and Specifications in the manner provided herein. If the Contractor or its Subcontractors, material or equipment suppliers, or any of their officers, agents, and employees performs, permits, or causes the performance of any Work under the Contract Documents, which it knows or should have known to be in error, inconsistent, or ambiguous, or not sufficiently detailed or explained, Contractor shall bear any and all costs arising therefrom including, without limitation, the cost of correction thereof without increase or adjustment to the Contract Price or the time for performance. Contractor shall maintain an adequate inspection system and perform personal observations and review work and pre-plan the project to ensure the Work performed under the Contract conforms to Contract requirements. Contractor shall maintain records of such review and observation to ensure strict compliance with the terms of the Contract.

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

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

### 1.2.2 Addenda and Deferred Approvals

1.2.2.1 *Addenda* are the changes in Specifications, Drawings, Contract Documents, and Plans which have been authorized in writing by the County or Architect, and which alter, explain, or clarify the Contract Documents. Addenda shall govern over all other Contract Documents. Subsequent addenda issued shall govern over prior addenda unless otherwise specified in the addenda.

1.2.2.2 *Deferred Approvals.* Deferred Approvals are Submittals that are reviewed by the Architect (or Engineer of Record) and submitted to the AHJ for approval based on thorough detailing of manufacturer and Project specific design. See Article 3.9.1 and 3.9.3. The Deferred Approval item cannot be fully detailed on the originally approved Drawings or Specifications because of variations in product design and manufacture. Contract Documents which require Deferred Approval items are meant

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to be for illustration purposes only. Approval of Plans for such a portion of the Work may be deferred until the material suppliers and Subcontractors are selected. All Deferred Approvals are noted in the Plans and Specifications. Contractor is responsible for all Deferred Approval requirements set forth in the Contract Documents. Contractor is responsible to comply with all laws, building codes, Title 24 and regulations necessary to obtain all necessary approvals, including those required from the Authority Having Jurisdiction (“AHJ”). Contractor shall not be granted an extension of time for failure to plan, schedule for and obtain necessary approvals. Contractor shall Schedule all Deferred Approval items in the Baseline Schedule and Schedule Updates under Article 3.9.6

### 1.2.3 Specification Interpretation

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

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

1.2.3.3 *General Conditions.* The General Conditions and Supplementary General Conditions are a part of the Contract Documents which further defines and refines the Contract entered between the Contractor and County.

1.2.3.4 *Abbreviations.* In the interest of brevity, the Specifications are written in an abbreviated form and may not include complete sentences. Omission of words or phrases such as “Contractor shall,” “shall be,” etc., are intentional. Nevertheless, the requirements of the Specifications are mandatory. Omitted words or phrases shall be supplied by inference in the same manner as they are when a “note” occurs on the Drawings. In the interest of brevity, the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

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

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

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

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### 1.2.4 Rules of Document Interpretation

1.2.4.1 In the event of conflict within the Drawings, the following rules shall apply:

- a. General Notes, when identified as such, shall be incorporated into other portions of Drawings.
- b. Schedules, when identified as such, are complementary with other notes and other portions of Drawings including those identified as General Notes.
- c. Larger scale Drawings shall take precedence over smaller scale Drawings.
- d. At no time shall the Contractor base construction on scaled Drawings.

1.2.4.2 Specifications shall govern as to materials, workmanship, and installation procedures.

1.2.4.3 If Contractor observes that Drawings and Specifications are in conflict, Contractor shall, prior to commencing work, notify the Architect in writing for the purposes of obtaining an interpretation of the Contract Documents.

1.2.4.4 In the case of conflict or inconsistencies, the order of precedence shall be as follows:

- a. General Conditions take precedence over Drawings and Specifications.
- b. Supplemental Conditions take precedence over General Conditions.
- c. The Agreement Form shall take precedence over the Supplemental Conditions.
- d. In the case of disagreement or conflict between or within Specifications, and Drawings, the more stringent, higher quality, and greater quantity of Work shall apply.
- e. Addenda shall take precedence over Drawings and Specifications.
- f. General Conditions shall take precedence over Addenda.
- g. Drawings and Specifications take precedence over the Soils Report.

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

The Drawings, Specifications, and other Contract Documents for the Project are the property of the County and/or Architect pursuant Contract requirements between the County and Architect. The Contractor may retain one Contract record set. Neither the Contractor nor any Subcontractor, or material or equipment supplier shall own or claim a Copyright in the Drawings, Specifications, and other documents prepared by the Architect. All copies except the Contractor's record set, shall be returned or properly accounted for

## **GENERAL CONDITIONS**

upon completion of the Work. The Drawings, Specifications, and other documents prepared by the Architect, and copies thereof furnished to the Contractor are not to be used by the Contractor or any Subcontractor, Sub-subcontractor, or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work. The County and/or Architect hereby grants the Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers a limited license to use applicable portions of the Drawings, Specifications, and other documents prepared for the Project in the execution of their Work under the Contract Documents. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the County's property interest or other reserved right.

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## ARTICLE 2 COUNTY

### 2.1 INFORMATION AND SERVICES REQUIRED OF THE COUNTY

#### 2.1.1 Site Survey

The County will furnish, at its expense, a legal description of the Site and a land survey showing the boundaries of the Site. Contractor shall be responsible for all surveys regarding location of construction, grading and site work.

#### 2.1.2 Soils

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

#### 2.1.3 Soils Report Part of the Contract Documents: Contractor Reliance

A soils investigation report has been obtained from test holes at the Site, and such report is incorporated into this Contract and made available for the Contractor's use in preparing its bid and Work under this Contract. Where the Plans and Specifications are more specific and provide more significant structure, systems, reinforcing, thicknesses, or construction methods, the Drawings shall control over the soils report. The soils report is available at the Architect's office for review and it is Contractor's responsibility to ensure that Contractor has reviewed the soils investigation report. Any information obtained from such report or any other information given on Drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only. If, during the course of Work under this Contract, Contractor encounters subsurface conditions which differ materially from those indicated in the soils report, then Contractor shall notify the County within five (5) calendar days of discovery of the condition, and changes to the Contract Price may be made in accordance with Article 7 entitled "Changes in the Work." Contractor agrees that no claim against County will be made by Contractor for damages and hereby waives any rights to damages in the event the Contractor fails to notify County within the five-day period mentioned above.

**WARNING: COUNTY DOES NOT WARRANT THE SOILS AT THE PROJECT SITE. CONTRACTOR HAS REVIEWED AND IS FAMILIAR WITH THE REQUIREMENTS OF THE SOILS INVESTIGATION REPORT. CONTRACTOR UNDERSTANDS THAT PLANS, DRAWINGS AND SPECIFICATIONS SUPERSEDE THE SOILS REPORT IF THERE ARE CONFLICTS. FURTHER, IN ADDITION TO THE INFORMATION IN THE SOILS REPORT, CONTRACTOR HAS CONDUCTED AN INDEPENDENT INVESTIGATION OF THE PROJECT SITE AND THE SOILS CONDITIONS OF THE SITE. COUNTY DOES NOT WARRANT THE SOILS CONDITIONS OF THE SITE AND CONTRACTOR IS FULLY RESPONSIBLE TO ASCERTAIN SITE CONDITIONS FOR THE PURPOSES OF DETERMINING CONSTRUCTION MEANS AND METHODS PRIOR TO COMMENCING CONSTRUCTION.**



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### 2.1.4 Utilities

2.1.4.1 *Location of Point of Connection.* The locations shown for the point of connection are approximate. It shall be the responsibility of the Contractor to determine the exact location of all service connections.

2.1.4.2 *Regional Notification Center.* Contractor, except in an emergency, shall contact the appropriate regional notification center at least two (2) business days prior to commencing any excavation if the excavation will be conducted in an area or in a private easement which is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the County, and obtain an inquiry identification number from that notification center. See Government Code section 4216.3. No excavation shall be commenced and carried out by the Contractor unless such an inquiry identification number has been assigned to the Contractor or any Subcontractor of the Contractor and the County has been given the identification number by the Contractor. Any damages arising from failure to make appropriate regional notification shall be at the sole risk of Contractor. Contractor shall solely be responsible for any fines, penalties or damages for violation of this Article and Government Code section 4216.6 or 4216.7. Any delays caused by failure to make appropriate regional notification shall be at the sole risk of Contractor and shall not be considered for extension of time pursuant to Article 8.4.

2.1.4.3 *Utilities - Removal and Restoration.* The County has endeavored to determine the existence of utilities at the Site of the Work from the records of the County of known utilities in the vicinity of the Work. The positions of these utilities as derived from such records are shown in the Contract Documents. Thus, the locations of the main or trunklines located on the Drawings are approximate locations and not exact.

No excavations were made to verify the locations shown for underground utilities. Other than the main or trunkline, which the County has endeavored to locate on the Plans, service connections or laterals to these utilities may not be shown on the Plans. It shall be the responsibility of the Contractor to determine the exact location of all service connections. The Contractor shall make its own investigations, including exploratory excavations, to determine the locations and type of service connections, prior to commencing work which could result in damage to such utilities. The Contractor shall immediately notify the County's representative as to any utility main or trunkline discovered by Contractor in a different position than provided by the Regional Notification Center. With respect to main or trunklines, Contractor is to immediately notify County if the location is substantially different than as shown in the Contract Documents.

Contractor shall coordinate its Work with all utilities, including, but not limited to electricity, water, gas and telephone and meet with said utilities prior to the start of any work. Contractor shall show timing of all utility coordination activities under the Scheduling requirements of Article 8.

2.1.4.4 *Other Utilities.* In case it should be necessary to remove, relocate, or temporarily maintain a utility because of interference with the Work, the work on the utility shall be performed and paid for as follows:

When it is necessary to remove, relocate or temporarily maintain a service connection, the cost of which is not required to be borne by the owner of the service connection, the Contractor shall bear all expenses incidental to the work on the service connection. The work on the service connection shall be done in a manner satisfactory to the owner thereof; it being understood that the owner

## GENERAL CONDITIONS

of the service connection has the option of doing such work with his own forces or permitting the work to be done by the Contractor.

When it is necessary to remove, relocate, or temporarily maintain a utility which is in the position shown on the Plans, the cost of which is not required to be borne by the owner thereof, the Contractor shall bear all expenses incidental to the work on the utility. The work on the utility shall be done in a manner satisfactory to the owner thereof; it being understood that the owner of the utility has the option of doing such work with his own forces or permitting the work to be done by the Contractor.

When it is necessary to remove, relocate, or temporarily maintain a utility which is not shown on the Plans or is in a position different from that shown on the Plans and were it in the position shown on the Plans would not need to be removed, relocated, or temporarily maintained, and the cost of which is not required to be borne by the owner thereof, the County will make arrangements with the owner of the utility for such work to be done at no cost to the Contractor, or will require the Contractor to do such work in accordance with Article 7 or will make changes in the alignment and grade of the Work to obviate the necessity to remove, relocate, or temporarily maintain the utility. Changes in alignment and grade will be ordered in accordance with Article 7 herein.

No representations are made that the obligations to move or temporarily maintain any utility and to pay the cost thereof is or is not required to be borne by the owner of such utility, and it shall be the responsibility of the Contractor to investigate to find out whether said cost is required to be borne by the owner of the utility.

The right is reserved to governmental agencies and to owners of utilities to enter at any time upon any street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work and for the purpose of maintaining and making repairs to their property.

### 2.1.5 Existing Utility Lines; Removal, Relocation

2.1.5.1 *Main or Trunkline Facilities.* If the Contractor while performing the Contract discovers utility facilities not identified in the Contract Documents, Contractor shall notify the County and utility in writing prior to commencing work.

The owner of the public utility shall have the sole discretion to perform repairs or relocation work or permit the Contractor to do such repairs or relocation work at a reasonable price.

The Contractor shall exercise reasonable care and shall be compensated by the County for the actual verified field costs of locating, and removing, relocating, protecting or temporarily maintaining such main or trunkline utility facilities located in a substantially different location than in the Plans and Specifications, and for equipment in use on the project necessarily idled during such work. This Work shall be performed in accordance with Article 7 of these General Conditions.

2.1.5.2 *Assessment.* Nothing in these subparagraphs shall be deemed to require the County to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the Site can be inferred from the presence of other visible facilities, such as buildings, or meter junction boxes on or adjacent to the Site and could be inferred from the Main or Trunkline shown on the Drawings.

## **GENERAL CONDITIONS**

2.1.5.3 *Notification.* If the Contractor, while performing Work under this Contract, discovers utility facilities not identified by the County in the Contract Documents. Contractor shall, within five (5) days, notify the County and the utility in writing. If Contractor fails to notify the County within forty eight hours after discovery of any utility facilities not identified by County in the Contract Documents, Contractor waives all rights to be compensated for any extra Work or damages resulting from such discovered utilities.

### 2.1.6 Easements

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

## **2.2 COUNTY'S RIGHT TO CARRY OUT THE WORK DUE TO PARTIAL DEFAULT IN A SPECIFIC SEGREGATED AREA OF WORK (48 HOUR NOTICE TO CURE AND CORRECT)**

If the Contractor Defaults or neglects to carry out the Work in accordance with the Contract Documents, the County may provide forty-eight (48) hour written notice to cure (a shorter period of time in the case of Emergency or a critical path delay as defined in Article 2.2.1) Contractor's Partial Default in a specific segregated area of work. The County's right to issue a Partial Default of the Contractor's Work and take over that segregated area of Work includes, but is not limited to:

1. Failure to supply adequate workers on the entire Project or any part thereof;
2. Failure to supply a sufficient quantity of materials;
3. Failure to perform any provision of this Contract;
4. Failure to comply with safety requirements, or due to Contractor is creation of an unsafe condition;
5. Cases of bona fide emergency;
6. Failure to order materials in a timely manner;
7. Failure to prepare Deferred Approval items or Shop Drawings in a timely manner;
8. Failure to comply with Contractor's Baseline or Update Schedule, meet critical Milestones which would result in a delay to the critical path, or delay the Contract Time;
9. Failure to comply with the Subletting and Subcontracting Fair Practices, Public Contract Code section 4100, et seq.
10. Failure to meet the requirements of the Americans with Disabilities Act;
11. Failure to complete Punch List work;
12. Failure to proceed on an Immediate Change Directive
13. Failure to correct a Notice of Deviation

## GENERAL CONDITIONS

If during the forty-eight (48) hour period, the Contractor fails to Cure and correct the deficiency noted in the 48-hour notice of Partial Default with diligence and promptness, the County may correct such deficiencies without prejudice to other remedies the County may have, including a Termination for Cause as set forth in Article 14. If there are inadequate funds remaining the Project balance or in the Retention Escrow to address at least 150% of the costs set forth in the Article 2.2 notice, the County may copy the Surety on the written notice of Partial Default. If a notice to the Surety is provided, except in the cases of emergency or critical path delay, the Surety has the option to take over and complete the Work described in the written notice if Surety personally delivers notice to County that it intends to perform such work. In the case where written notice has been provided, the County shall allow Surety seven (7) days to perform the Work.

### 2.2.1 Service of Notice of Partial Default with Right to Cure

A written notice of Partial Default and right to cure under Article 2.2 (“Article 2.2 Notice” or “Notice of Partial Default”) shall be served by e-mail (with a copy provided by regular mail) to the e-mail address provided on the Bid submitted and copied to the Project Superintendent.

### 2.2.2 Shortened Time for Partial Default in the Case of Emergencies.

In an Emergency situation, the County may correct any of the deficiencies described in Article 2.2 without prejudice to other remedies by providing service of written notice of Emergency requiring a shortened time for Partial Default specifying the time given to cure, if any.

### 2.2.3 Shortened Time for Partial Default in the Case of Critical Path Delay

In the case of critical path delay, the County may correct any of the deficiencies described in Article 2.2 without prejudice to other remedies providing service of written notice of critical path delay to the Contractor with a specific description of the critical path delay items noting the line item or area of Work that is on the critical path and prescribe the length of shortened time to cure, if any.

### 2.2.4 Written Notice of Partial Default to be Deducted by Deductive Change Order

The County shall have the right to determine the reasonable value of the Article 2.2 Partial Default Work, or if there is an actual value for the Work, shall use that value and issue a Deductive Change Orders under Article 7.7.4

# GENERAL CONDITIONS

## ARTICLE 3 THE CONTRACTOR

### 3.1 SUPERVISION AND CONSTRUCTION PROCEDURES

#### 3.1.1 Contractor

The Contractor shall continually supervise and direct the Work using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, procedures; and shall coordinate all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. The Contractor shall not perform the Work without utilizing the Contract Documents or, where required, approved Submittals, Shop Drawings, or samples for any such portion of the Work. If any of the Work is performed by contractors retained directly by the County, Contractor shall be responsible for the coordination and sequencing of the work of those other contractors so as to avoid any impact on the Project Schedule pursuant to the requirements of Article 6 and Article 8. Specific duties of the Contractor shall include those set out in Section 43 of Title 21 of the California Code of Regulations. These duties include, but are not limited to the following:

3.1.1.1 *Responsibilities.* It is the duty of the Contractor to complete the Work covered by his or her Contract in accordance with the approved Plans and Specifications. The Contractor in no way is relieved of any responsibility by the activities of the Architect, Engineer, Inspector or the AHJ in the performance of their duties.

3.1.1.2 *Performance of the Work.* The Contractor shall carefully study the approved Plans and Specifications and shall plan its schedule of operations well ahead of time. If at any time it is discovered that work is being done which is not in accordance with the approved Plans and Specifications, the Contractor shall correct the Work immediately.

#### 3.1.2 Contractor Responsibility to Study the Plans and Specifications

All inconsistencies or timing or sequences which appear to be in error in the Plans and Specifications shall promptly be called to the attention of the Architect or, Engineer, for interpretation or correction. Local conditions which may affect the structure shall be brought to the Architect's attention at once. In no case, shall the instruction of the Architect be construed to cause work to be done which is not in conformity with the approved Plans, Specifications, change orders, construction change documents, and as required by law.

#### 3.1.3 All Work Under the Direction of Inspector

Pursuant to Title 24 requirements, the Contractor shall not carry on Work except with the knowledge of the Inspector.

#### 3.1.4 Contractor to Establish Timing and Protocol with Inspector

Contractor shall establish a protocol for requesting inspection with Inspector so as to not delay the Work and provide adequate time for the Inspector to perform inspection. If such a protocol is not established ahead of time, Inspector may utilize the time criteria of 48 hours in advance of submitting any required documentation. Contractor is responsible for delays and for failure to plan.

## **GENERAL CONDITIONS**

For some Projects, there may be a need to incrementally install certain assemblies. It is up to Contractor to identify areas and assemblies that may be constructed incrementally. Contractor must identify and establish incremental areas of construction and establish protocols with Inspector for AHJ approvals so they may be presented to AHJ.

### 3.1.5 Contractor Responsibility

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

### 3.1.6 Obligations not Changed by Architect's Actions

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

### 3.1.7 Acceptance/Approval of Work

The Contractor shall be responsible to determine when any completed portions of the Work already performed under this Contract or provided pursuant to Article 6 are suitable to receive subsequent Work thereon.

## 3.2 **SUPERVISION**

### 3.2.1 Full Time Supervision

Unless personally present on the Project site where the Work is being performed, the Contractor shall keep on the Work at all times during its progress a competent, English speaking construction Superintendent satisfactory to the County. The Superintendent shall be present on a full-time basis, shall be dedicated exclusively to the Project and shall not share superintendency duties with another project or job. The Superintendent shall not be replaced except with written consent of the County. The Superintendent shall represent the Contractor in its absence and shall be fully authorized to receive and fulfill any instruction from the Architect, the Inspector, the County or any other County Representative (including CM in the cases where the County has a CM representative). All Requests for Information shall be originated by the Superintendent and responses thereto shall be given to the Superintendent. No Work shall begin on any day by any Subcontractor or other person on the Project site until the Superintendent has arrived, or shall any Work continue during the day after the Superintendent has departed from the Project site. The Superintendent shall have authority to bind Contractor through the Superintendent's acts. The Superintendent shall represent the Contractor, and communications given to the Superintendent shall be binding on the Contractor. Before commencing the Work, Contractor shall give written notice to County (and CM representative) and Architect of the name and a Statement of Qualifications of such superintendent. Superintendent shall not be changed except with written consent of County, unless a superintendent proves to be unsatisfactory to Contractor and ceases to be in its employ, in which case, Contractor shall notify County and Architect in writing. Contractor shall provide a replacement superintendent approved by the County prior to performing additional work.

### 3.2.2 Staff

## **GENERAL CONDITIONS**

Notwithstanding other requirements of the Contract Documents, the Contractor and each Subcontractor shall: (1) furnish a competent and adequate staff as necessary for the proper administration, coordination, supervision, and superintendence of its portion of the Work; (2) organize the procurement of all materials and equipment so that the materials and equipment will be available at the time they are needed for the Work; and (3) keep an adequate force of skilled and fit workers on the job to complete the Work in accordance with all requirements of the Contract Documents.

### 3.2.3 Right to Remove

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

## 3.3 LABOR AND MATERIALS

### 3.3.1 Contractor to Provide

Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, material, equipment, tools, construction equipment and machinery, water, heat, air conditioning, utilities, transportation, and other facilities, services and permits necessary for proper execution and completion of the Work whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

### 3.3.2 Quality

Unless otherwise specified, all materials and equipment to be permanently installed in the Project shall be new and shall be of the highest quality or as specifically stated in the Contract Documents. The Contractor shall, if requested, furnish satisfactory evidence as to kind and quality of all materials and equipment within ten (10) days of a written request by the County, including furnishing the County with bona fide copies of invoices for materials or services provided on the Project. All labor shall be performed by workers skilled in their respective trades, and shall be of the same or higher quality as with the standards of other school construction.

### 3.3.3 Replacement

Any work, materials, or equipment, which do not conform to these requirements or the standards set forth in the Contract Documents, may be disapproved by the County, in which case, they shall be removed and replaced by the Contractor at no additional cost or extension of time to the County.

### 3.3.4 Discipline

The Contractor shall enforce strict discipline and good order among the Contractor's and Subcontractor's employees, and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them. As used in this subsection, "unfit" includes any person who the County concludes is improperly skilled for the task assigned to that person, who fails to comply with the requirements of this article, or who creates safety hazards which jeopardize other persons and/or property.

### 3.3.5 Fingerprinting (Applicable at the time Project is Occupied and on all Projects where Workers will come in Contact with Pupils, such as Modernization Projects)

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If applicable, Contractor shall comply with the applicable provisions of Education Code section 45125.1 in a method as determined by the County. Pursuant to Education Code section 45125.1, Contractor shall either conduct criminal background checks of all employees of Contractor assigned to the Project site, and shall certify that no employees who have been convicted of serious or violent felonies, as specified in Education Code section 45125.1, will have contact with pupils, by utilizing the Certification Regarding Background Checks and the corresponding Attachment “A” as found in the Contract Documents or shall be separated by a physical barrier from students.

If it is determined that Contractor must provide certification of employees, as part of such certification, Contractor must provide the County with a list of all employees providing services pursuant to this Agreement, and designate which sites such employees will be assigned. In performing the services set forth in this Agreement, Contractor shall not utilize any employees who are not included on the above-referenced list.

At County’s sole discretion, County may make a finding, as authorized under Education Code section 45125.1, that Contractor’s employees will have only “limited contact” with pupils. Contractor’s failure to comply with this law shall be considered a material breach of this Agreement upon where this Agreement may be terminated, at County’s sole discretion, without any further compensation to Contractor.

In the case of new construction Projects where there are no students, if the Project Schedule provides for Beneficial Occupancy or portions of the Project or if the Project should be delayed, then Contractor, at no additional costs, shall meet the requirements of either fingerprinting or providing a physical barrier as required by the County.

### 3.3.6 Noise, Drugs, Tobacco, and Alcohol

Contractor shall take all steps necessary to insure that employees of Contractor or any of its Subcontractors’ employees do not use, consume, or work under the influence of any alcohol, tobacco or illegal drugs while on the Project. Contractor shall further prevent any of its employees or its Subcontractor employees from playing any recorded music devices or radios or wearing any radio headphone devices for entertainment while working on the Project. Likewise, Contractor shall prevent its employees or Subcontractor’s employees from bringing any animal onto the Project. Contractors shall not violate any written school policies.

### 3.3.7 Delivery of Material

Contractor shall place orders for materials or equipment so that the Work may be completed in accordance with the Construction schedule for the Work as set forth in Article 8 of this Agreement. Contractor shall, upon demand from the Architect, furnish to the Architect documentary evidence including, but not limited to purchase orders, invoices, bills of materials, work orders and bills of lading, showing that orders have been placed. Contractor shall have a system to receive materials and to ensure that the proper materials are being delivered, including in the case of critical materials to the Project, checking the delivery against Shop Drawings and ensuring that the materials meet the requirements of not only the Plans and Specifications, but also the approved Shop Drawings and Submittals and in conformance with Contractor’s plan for delivery of materials (including but not limited to Contractor’s representations in the Schedules for the Project and Contractor’s equipment and materials schedule under Article 3.7.2.2). Contractor shall be responsible for all costs of accepting non-conforming materials delivered to the Project given Contractor’s responsibilities and system for acceptance of deliveries. Contractor shall notify Inspector and County Representative (including CM) as early as possible, in writing, of the delivery of



## GENERAL CONDITIONS

materials for the Project. The deliveries shall include documentation identifying the shipment sufficiently so that the Inspector, Architect or County Representative (including CM) may review the materials that are received. Under no circumstances shall materials be delivered to the Project site that are meant for another Project.

### 3.3.8 Liens and Other Security Interests of Subcontractors and Material Suppliers

No material, supplies, or equipment for the Work shall be purchased subject to any chattel mortgage or under a conditional sale or other agreement by which an interest therein or in any part thereof is retained by seller or supplier. Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver premises, together with all improvements and appurtenances constructed or placed thereon by it, to County free from any claims, security interests, liens, or charges. Contractor further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any Work covered by this Contract shall have any right to place a lien upon the premises or any improvement or appurtenance thereof, except that Contractor may install metering devices or other equipment of a utility company or political subdivision, title to which is commonly retained by the utility company or political subdivision. In event of installation of any such metering device or equipment, Contractor shall advise County as to its owner within five (5) days of such installation in writing, prior to making the installation.

Contractor agrees to indemnify, defend and hold the County harmless from any liens, stop notices, or assertion of security interests, including judgments and levies. If after written notice Contractor fails to address the lien, stop notice, or other security interest, the County may proceed to address the lien, stop notice or claim and seek reimbursement from Contractor.

### 3.3.9 Title to Materials

The title to new materials or equipment for the Work of this Contract shall remain with Contractor until incorporated in the Work of this Contract until final acceptance of the Project; no part of said materials shall be removed from its place of storage, and Contractor shall keep an accurate inventory of all said materials and equipment in a manner satisfactory to the County or its authorized representative. Responsibility for materials remains with Contractor and Contractor shall replace materials in case of loss. County similarly may pay for materials stored off site, but Contractor shall remain responsible for the materials that are stored off site.

### 3.3.10 Assemblies

For all material and equipment specified or indicated in the Drawings, the Contractor shall provide all labor, materials, equipment, and services necessary, (including engineering as specifically required with Shop Drawings or Deferred Approvals) for complete assemblies and complete working systems. Incidental items not indicated on the Drawings, nor mentioned in the Specifications, that can legitimately and reasonably be inferred to belong to the Work described, or be necessary in good practice to provide a complete assembly or system, shall be furnished as though itemized in the Contract Documents in every detail. In all instances, material and equipment shall be installed in strict accordance with each manufacturer's most recent published recommendations and Specifications.

### 3.3.11 Noise Control

## GENERAL CONDITIONS

The Contractor shall be responsible for the installation of noise reducing devices on construction equipment. Contractor shall comply with the requirements of the city and county having jurisdiction with regard to noise ordinances governing construction sites and activities. Construction equipment noise is subject to the control of the Environmental Protection Agency's Noise Control Program (Part 204 of Title 40, Code of Federal Regulations). If school is in session at any point during the progress of the Project, and, in the County's reasonable discretion, the noise from such Work disrupts or disturbs the students or faculty or the normal operation of the school, at the County's request, the Contractor shall schedule the performance of all such Work around normal school hours or make other arrangements so that the Work does not cause such disruption or disturbance. There are specific periods of testing at operational schools and it is critical that Contractor control noise during periods of testing. In no event shall Contractor have a right to receive additional compensation or an extension to the Contract time as a result of any such rescheduling or the making of such arrangements. These controls shall be implemented during site preparation and construction. All noise related issues, including school operations, and noise during testing should be detailed in the Schedule provided pursuant to Article 8

### **3.4 WARRANTY**

The Contractor warrants to the County and Architect that material and equipment furnished under the Contract will be of the highest quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. Contractor's warranty to County includes, but is not limited to, the following representations:

3.4.1 In addition to any other warranties provided elsewhere, Contractor shall, and hereby does, warrant all Work after the date of Notice of Completion of Work by County and shall repair or replace any or all such Work, together with any other Work, which may be displaced in so doing that may prove defective in workmanship or materials within a one (1) year period from date of Final Completion which shall be no later than the final date of Punch List as noted at Article 9.11) without expense whatsoever to County, ordinary wear and tear, unusual abuse or neglect excepted. County will give notice of observed defects with reasonable promptness. Contractor shall notify County upon completion of repairs.

3.4.2 In the event of failure of Contractor to comply with above mentioned conditions within one week after being notified in writing, County is hereby authorized to proceed to have defects repaired and made good at expense of Contractor who hereby agrees to pay costs and charges therefore immediately on demand.

3.4.3 If, in the opinion of the County, defective Work creates a dangerous condition or requires immediate correction or attention to prevent further loss to the County, the County will attempt to give the notice required by this Article. If the Contractor cannot be contacted or does not comply with the County's requirements for correction within a reasonable time as determined by the County, the County may, notwithstanding the provisions of this article, proceed to make such correction or attention which shall be charged against Contractor. Such action by the County will not relieve the Contractor of the guarantee provided in this Article or elsewhere in this Contract.

3.4.4 This Article does not in any way limit the guarantee on any items for which a longer warranty is specified or on any items for which a manufacturer gives a

## **GENERAL CONDITIONS**

guarantee for a longer period. Contractor shall furnish County all appropriate guarantee or warranty certificates upon completion of the project.

### **3.5 TAXES**

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

### **3.6 PERMITS, FEES AND NOTICES**

#### **3.6.1 Payment**

The Contractor shall secure and pay for all permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are necessary after execution of the Contract and are legally required by any authority having jurisdiction over the Project. County shall be responsible for all testing and inspection as required by the AHJ on-site or within the distance limitations set forth in Article 13.5.2, unless a different mileage range is specified in the Supplemental Conditions.

#### **3.6.2 Compliance**

The Contractor shall comply with and give notices required by any law, ordinance, rule, regulation, and lawful order of public authorities bearing on performance of the Work. There will be local governmental oversight from City, County or both. Finally, Regional Water Quality Control Board, State Fire Marshall, local fire marshal, Department of Industrial Relations, Department of Labor Standards Enforcement, and Air Quality Management County (Local and State) are some of the agencies that provide oversight and may require specific permits, fees, or provide oversight over the Project. Contractor represents understanding and specialized knowledge of the rules governing school districts and Contractor shall maintain compliance over the applicable rules and will file all documents required in order to ensure compliance with State, local, and other rules that apply to the Project.

#### **3.6.3 Responsibility**

The Contractor shall perform all Work in conformance with every law, statute, ordinance, building code, rule or regulation. The Contractor shall assume full responsibility for such Work and shall bear the attributable cost of correction or project delay.

“Contractor shall carefully study the approved Plans and Specifications and shall plan a schedule of operations well ahead of time.... All inconsistencies or items which appear to be in error in the Plans and Specifications shall be promptly called to the attention of the architect or registered engineer, through the inspector, for interpretation or correction.”

### **3.7 SUBMITTALS REQUIRED AT THE COMMENCEMENT OF THE PROJECT**

#### **3.7.1 Requirements Within Ten (10) Calendar Days**

Within ten (10) calendar days after Notice to Proceed, Contract shall submit the following:

##### **3.7.1.1 Detailed Schedule of Values (See Article 9.2)**

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3.7.1.2 Submittal Listing and Schedule for Submittals

3.7.1.3 Critical Path Baseline Schedule (See Article 8)

### 3.7.2 Requirements Within Thirty-Five (35) Calendar Days

Within thirty-five (35) calendar days after Notice to Proceed, Contractor shall submit the following:

3.7.2.1 *All Submittals for the Project* except those specifically agreed upon by County and Architect, in writing, and shall be specifically incorporated into the Submittal section of the Schedule so as to not delay the Work. The agreement to allow a later Submittal does not mean that Article 3.3.7 is waived. Contractor shall order materials and ensure prices are honored and secured for the Project.

- a. Structural Steel may be included as a later Submittal than 35 days if Structural Steel is a significant portion of the Work, at least one or some of the Project is a structural steel structural system, or as specifically agreed upon by the Architect or County.
- b. It is specifically agreed that submissions of structural steel Submittals shall not be piecemeal (unless some portion is requested separately by the County or Architect), shall provide complete designs, shall be stamped by the structural steel Subcontractor, Contractor, and structural steel Subcontractor's structural engineer at time of submission and as further addressed in Article 3.9.
- c. In no case shall the submission of structural steel Drawings delay the critical path for the schedule. If a Milestone is provided for submission of complete structural steel Shop Drawings then the date shall be no later than as set forth in the Milestone

3.7.2.2 *Exceptions to Submittal Within Thirty-Five (35) Days by Written Agreement.* A written request detailing the specific reasons for a submission later than 35 days due to complexity of design or non-critical path status of the Submittal shall be submitted at the time the Baseline Schedule is submitted. The Baseline Schedule shall not include a delayed Submittal until written agreement is provided. In addition to the request for providing a Submittal after the thirty-five (35) day period, a copy of the Contract with the Subcontractor who shall be performing the Submittal, a written statement from the Subcontractor verifying that work has commenced on the Submittal and providing Subcontractor's own schedule of Milestones and completion dates, and a corresponding Submittal designation in the Schedule as required under Article 8. Approval of a delayed Submittal shall not result in any increase in the Contract Price or result in an extension of time for the completion of the Project.

3.7.2.3 *Piecemeal Submissions of Submittals.* Piecemeal Submittals mean providing portions of Shop Drawings or Submittals as they are being completed. The submission of piecemeal Submittals results in the appearance of a submission when there is inadequate information for the Architect or Engineer to adequately review a submission. Piecemeal differs from submission of complete buildings or phases of buildings or complete assemblies. The Architect may agree to allow submission of single buildings or areas as long as the Submittals are complete.

## **GENERAL CONDITIONS**

### **3.8 DOCUMENTS, SAMPLES, AND COMPUTER AT THE SITE**

The Contractor shall maintain at the Site for the County one current copy of the California Building Code, Titles 19 and 24 of the California Code of Regulations, any other document required by the AHJ, and one record copy of the Drawings, Specifications, Addenda, Change Orders, and other Modifications, in good order and marked currently to record changes and selections made during construction. In addition, the Contractor shall maintain at the Site approved Shop Drawings, Product Data, Samples, and similar required Submittals. These documents shall be available to the Architect and shall be delivered to the Architect for delivery to the County upon completion of the Work.

Contractor shall have an operational computer with internet access so the Contractor can review and post documents as required for the Project, including but not limited to the filing and posting of AHJ required documents for the Project.

Contractor shall be prepared to review documents posted to the AHJ Project website.

### **3.9 SUBMITTALS INCLUDING SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES**

#### **3.9.1 Definitions**

3.9.1.1 *Deferred Approvals.* Approval of certain aspects of the construction may be deferred until the construction Contract has been awarded. To facilitate the design process, AHJ grants Deferred Approval to the design and detailing of certain elements of the Project at the request of the Architect or Engineer of Record. Design elements that may be deferred may include, but are not limited to access floors, bleachers, elevator guide rails and related elevator systems, exterior wall systems - precast concrete, glass fiber reinforced concrete, etc., skylights, window wall systems, storefronts, stage rigging, and other systems as noted in the Contract Documents. (Also see Article 1.2.2.2 and 3.9.3)

3.9.1.2 *Shop Drawings.* The term “Shop Drawings” as used herein means Drawings, diagrams, equipment or product schedules, and other data, which are prepared by Contractor, Subcontractors, manufacturers, suppliers, or distributors illustrating some portion of the Work, and includes: illustrations; fabrication, erection, layout and setting Drawings; manufacturer’s standard Drawings; schedules; descriptive literature, instructions, catalogs, and brochures; performance and test data including charts; wiring and control diagrams; and all other Drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment, or systems and their position conform to the requirements of the Contract Documents.

3.9.1.3 *Manufactured* applies to standard units usually mass-produced, and “Fabricated” means items specifically assembled or made out of selected materials to meet individual design requirements. Shop Drawings shall: establish the actual detail of all manufactured or Fabricated items, indicate proper relation to adjoining work, amplify design details of mechanical and electrical systems and equipment in proper relation to physical spaces in the structure, and incorporate minor changes of design or construction to suit actual conditions.

3.9.1.4 *Submittals* is a term used interchangeably and sometimes refers to Shop Drawings, Product Data, and samples since all Subcontractor submissions are tracked in a Submittal Log and may include any of the noted items. However, generally, a Submittal is a manufacturer’s product information and Product Data including description, characteristics, size, physical characteristics, and requirements to prepare the jobsite for receiving of the particular manufactured item.

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

### 3.9.2 Shop Drawings.

3.9.2.1 *When Shop Drawings Are Required.* Shop Drawings are required for prefabricated components and for installation and coordination of these prefabricated components into the Project. In addition, Shop Drawings, are prepared to address the actual size and installation of components from various Subcontractors and provides an opportunity for the Contractor to coordinate and address conflicts between the subcontracting trades. In some cases, each Subcontractor or trade will provide Shop Drawings in a BIM format or other format as agreed by County.

3.9.2.2 *Purpose for Shop Drawings.* Shop Drawings are the Contractor’s manufacturer, Subcontractor, supplier, vendor or the Contractor’s detailed drawings showing particularized method for assembly, specifics to a manufacturer, manufacturer component installation requirements, specifics as to a manufactured item, alterations to a manufactured, a custom created item, or drawn version of more detailed information expanding on the Architect’s design shown in the Contract Documents. The Shop Drawings address the appearance, performance, size, weight, characteristics and prescriptive descriptions associated with the Contractor or Contractor’s Subcontractor’s plan for installation or assembly based on the design in the Specifications and Contract Documents. The Shop Drawing often is more detailed than the information shown in the Contract Documents to give the Architect and Engineer the opportunity to review the fabricator’s version of the product (along with particulars specific to that particular product), prior to fabrication. References to the Contract Documents, Construction Documents, Drawings, Plans, and Specifications assist the Architect and Engineer in their review of the Shop Drawings. Attachment of manufacturer’s material Specifications, “catalog cut sheets,” and other manufacturer’s information may be provided to accompany Shop Drawings. Because Shop Drawings facilitate the Architect’s and Engineer’s approval of the system, they should be as clear and complete as possible so they may be reviewed by Architect or Engineer for the Project.

3.9.2.3 *Shop Drawing Requirements.* The Contractor shall obtain and submit with Shop Drawings all seismic and other calculations and all Product Data from equipment manufacturers. “Product Data” as used herein are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.

3.9.2.4 *Not a Reproduction of Architectural or Engineering Drawings.* The Shop Drawings are not a reproduction of the architectural or engineering Drawings. Instead, they must show more detail than the Construction Documents and details the fabrication and/or installation of the items to the manufacturer’s production crew or Contractor’s installation crews.

3.9.2.5 *Shop Drawings Engineering Requirements:* Some Shop Drawings require an engineer stamp to be affixed on the Drawings and calculations. In such cases, a current and valid engineering stamp shall be affixed by a California registered engineer. No out of State engineers shall stamp Shop Drawings. In most cases, an engineer means California registered mechanical, structural,

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electrical or plumbing engineer. California Registered Civil Engineers will not be accepted for structural details unless specifically approved by AHJ.

3.9.2.6 *AHJ Approvals Required Prior to Work.* No work on a Shop Drawing that requires the AHJ approval may proceed until the AHJ approval is received. Contractor has provided the AHJ approval time and allowed adequate time for corrections in Contractor's Schedule as required pursuant to Article 8.

3.9.2.7 *Shop Drawing Identification.* All Shop Drawings must be properly identified with the name of the Project and dated, and accompanied by a letter of transmittal referring to the name of the Project and to the Specification section number for identification of each item clearly stating in narrative form, as well as "clouding" all qualifications, departures, or deviations from the Contract Documents. Shop Drawings, for each section of the Work shall be numbered consecutively and the numbering system shall be retained throughout all revisions. All Subcontractor submissions shall be made through the Contractor. Each drawing shall have a clear space for the stamps of Architect and Contractor.

### 3.9.3 Deferred Approvals

Deferred approvals shall be submitted and processed to ensure all AHJ and other governmental approvals are secured so as to not delay the Project. There may be additional requirements for Deferred Approvals at Division 1 of the Specifications. All Deferred Approvals shall be prepared by Contractor or Contractor's agent early enough so as to not delay the Project. As a result, any delay associated with the time for approval by applicable agencies or by the Architect or Architect's consultants shall be Contractor's. Contractor is required to comply with inclusion of Deferred Approvals in the Schedule as required under Article 3.9.6 *AHJ Approvals Required Prior to Work.* No work on a Deferred Approval item may proceed on the components until AHJ approval is received. Contractor has provided AHJ approval time and allowed adequate time for any AHJ revisions in Contractor's Schedule as required pursuant to Article 8.

### 3.9.4 Submittals and Samples

3.9.4.1 *Information Required With Submittals:* Manufacturer, trade name, model or type number and quantities: Information provided must be of sufficient detail to allow Architect and Engineer to compare the submitted item with the specified products and acceptable products listed, in the Specifications and addenda.

3.9.4.2 *Description of Use and Performance Characteristics:* Information should be furnished describing the normal use and expected performance of the product. The Architect and Contractor review this information to confirm that the product is appropriate for the intended use.

3.9.4.3 *Size and Physical Characteristics:* The size and physical characteristics, such as adjustment capabilities, which is reviewed by both the Contractor and Architect. The Contractor has the most available information for comparing adjoining materials and equipment. The Contractor also needs to know the size and weight of the equipment for lifting and handling considerations.

3.9.4.4 *Finish Characteristics:* The Architect reviews the available finishes and selects the appropriate finish, if the finish was not previously specified in the documents. The Contractor should confirm that finish requirements in the Specifications are being met by the product.

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3.9.4.5 *Contractor Responsible for Jobsite Dimensions:* Some material is custom-fabricated to job conditions, requiring dimensions from the jobsite. These jobsite dimensions are provided by the Contractor as part of the Contractor's responsibilities for the Project and shall be provided prior to release of the product for manufacture. Contractor shall not rely on Architect or Engineers to provide jobsite dimensions.

3.9.4.6 *Full Range of Samples Required (When Specific Items Not Specified).* Except in cases where the exact color and type of item is specified since the County is utilizing items Standardized or pre-selected by County, the full range of color, graining, texture, or other characteristics are anticipated for review in finished products, a sufficient number of samples of the specified materials shall be furnished by the Contractor to indicate the full range of characteristics which will be present in the finished products. Products delivered or erected without Submittal and approval without providing a full range of samples shall be subject to rejection. Except for range samples, and unless otherwise called for in the various sections of the Specifications or Specification Section 1, samples shall be submitted in duplicate.

3.9.4.7 *Labeling of Samples.* All samples shall be marked, tagged, or otherwise properly identified with the name of the submitting party, the name of the Project, the purpose for which the samples are submitted and the date.

3.9.4.8 *Transmittal letter.* All samples shall be accompanied by a letter of transmittal containing similar information, together with the Specification section number.

3.9.4.9 *Labels and Instructions.* All samples of materials shall be supplied with the manufacturer's descriptive labels and application instructions. Each tag or sticker shall have clear space for the review stamps of Contractor and Architect.

3.9.4.10 *Architect's Review.* The Architect will review and, if appropriate, approve submissions and will return them to the Contractor with the Architect's stamp and signature applied thereto, indicating the timing for review and appropriate action in compliance with the Architect's (or County's) standard procedures. In the cases where a CM is hired by the County, CM may be the party that receives and performance logging and initial processing of the Samples. CM may, in some cases, reject samples that are not in conformance with Contract requirements.

### 3.9.5 Submittal Submission Procedure

3.9.5.1 *Transmittal Letter and Other Requirements.* All Submittals must be properly identified with the name of the Project and dated, and each lot submitted must be accompanied by a letter of transmittal referring to the name of the Project and to the Specification section number for identification of each item clearly stating in narrative form, as well as "clouding" on the submissions, all qualifications, departures, or deviations from the Contract Documents. Shop Drawings, for each section of the Work shall be numbered consecutively and the numbering system shall be retained throughout all revisions. All Subcontractor submissions shall be made through the Contractor. Each drawing shall have a clear space for the stamps of Architect and Contractor. Refer to Division 1. In the case where a CM is hired on the Project, the CM may be designated to receive the Submittals for the Project, log the Submittals, and in some cases reject Submittals that do not conform to Contract requirements. Submittal Procedures for further information.

3.9.5.2 *Copies Required.* Each Submittal shall include one (1) legible, reproducible (if electronic is available, electronic copies shall also be provided) and five (5) legible prints of each drawing or schedule, table, cut sheet, etc., including fabrication, erection, layout and setting



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drawings, and such other drawings as required under the various sections of the Specifications, until final acceptance thereof is obtained. Subcontractor shall submit copies, in an amount as requested by the Contractor, of: (1) manufacturers' descriptive data for materials, equipment, and fixtures, including catalog sheets showing dimensions, performance, characteristics, and capacities; (2) wiring diagrams and controls; (3) schedules; (4) all seismic calculations and other calculations; and (5) other pertinent information as required by the County or Architect. (See also Division 1)

3.9.5.3 *Corrections.* The Contractor shall make all corrections required by Architect, County or CM and shall resubmit, as required by Architect or CM, corrected copies of Shop Drawings or new samples until approved. Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections required by the Architect on previous submissions. Professional services required for more than one (1) re-review of required Submittals of Shop Drawings, Product Data, or samples are subject to charge to the Contractor pursuant to Article 4.5.

3.9.5.4 *Approval Prior to Commencement of Work.* No portion of the Work requiring a Shop Drawing or sample submission or other Submittal shall be commenced until the submission has been reviewed by Contractor and Architect (and CM, if applicable) and approved by Architect (and CM where applicable) unless specifically directed in writing by the Architect. All such portions of the Work shall be in accordance with approved Shop Drawings and samples.

3.9.5.5 *County's Property.* All Submittals, Shop Drawings, computer disks, BIM modeling information, clash checks, schedules, annotated Specifications, samples and other Submittals shall become the County's property upon receipt by the County or Architect.

### 3.9.6 Schedule Requirements for Submittals

Contractor shall obtain and shall submit all required Submittals (i.e. Shop Drawings, Deferred Approvals, Samples, etc.), in accordance with Contractor's "Schedule for Submission of Shop Drawings and Samples" as required in the scheduling portion of the General Conditions at Articles 8 and the Specifications (as long as the Specifications do not conflict with General Conditions. In the case of conflict, the conflicting provision shall be controlled by the General Conditions and the remaining Specifications sections shall be interpreted as if the general conditions language is inserted) with such promptness as to cause no delay in its own Work or in that of any other contractor or subcontractor but in no event later than thirty five (35) days after the Notice to Proceed is issued except in the specific cases noted as an exception under Article 3.7.2.1. No extensions of time will be granted to Contractor or any Subcontractor because of its failure to have Shop Drawings and samples submitted in accordance with Division 1 and the Schedule. Each Subcontractor shall submit all Shop Drawings, samples, and manufacturer's descriptive data for the review of the County, the Contractor, and the Architect through the Contractor.

3.9.6.1 *Consideration of Schedule.* Contractor has considered lead times, AHJ or other agency governmental review times, Architect or Engineer review times, manufacturing seasons, and specific long lead procurement concerns for all submittals for the Project.

### 3.9.7 General Submittal Requirements

3.9.7.1 *Contractor Submittal Representations and Coordination.* By submitting Shop Drawings, Product Data, samples, etc., the Contractor represents that it has determined and verified all materials, field measurements, catalog numbers, related field construction criteria, and other relevant data in connection with each such submission, and that it has checked, verified, and coordinated the

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information contained within such Submittals with the requirements of the Work and of the Contract Documents, including the construction schedule.

3.9.7.2 *Contractor Coordination.* Contractor shall stamp, sign, and date each Submittal indicating its representation that the Submittal meets all of the requirements of the Contract Documents and evidence Contractor's review through execution of the following stamp to be placed on each Shop Drawings:

“[Contractor] has reviewed and approved the field dimensions and the construction criteria, and has also made written notation regarding any information in the Shop Drawings and Submittals that does not conform to the Contract Documents. This Shop Drawing or Submittal has been coordinated with all other Shop Drawings and Submittals received to date by me as Contractor and this duty of coordination has not been delegated to Subcontractors, material suppliers, the Architect, or the Engineers on this Project.”

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Signature of Contractor and date

3.9.7.3 *No Deviation from Contract Documents.* The submission of the Shop Drawings, Product Data, samples, etc., shall not deviate from the *requirements* of the Contract Documents including detailing and design intent which is specifically outlined in Contract Documents except as specifically authorized by the Architect or through an accepted substitution pursuant to Article 3.10.4. All deviations from the Contract Documents shall be narratively described in a transmittal accompanying the Shop Drawings. However, Shop Drawings shall not be used as a means of requesting a substitution, the procedure for which is defined in Article 3.10.4, “Substitutions.”

3.9.7.4 *Contractor Responsibility for Shop Drawings Conformance to Contract Documents.* Review by County and Architect shall not relieve the Contractor or any Subcontractor from its responsibility in preparing and submitting proper Shop Drawings in accordance with the Contract Documents.

3.9.7.5 *Incomplete Submittals.* Any submission, which in Architect's opinion is incomplete, contains errors, or has been checked superficially, will be returned not reviewed by the Architect for resubmission by the Contractor. Refer to Submittal Procedures of the Specifications for additional information. The Contractor shall be responsible for any related delays and shall not be the basis for any Claim.

3.9.7.6 *Shop Drawings and Submittals Shall Not Be Used as a Method to Make a Substitution.* Shop Drawings and Submittals shall not be used as a means of requesting a substitution or to make changes in the Contract Documents. If changes are made to the Contract Documents through the Shop Drawings, the Architect shall have the right to reject the Submittal. If the Architect does not note the deviation from the approved Plans and Specifications, the Contractor is still responsible for the change and the Architect or the County may require the Shop Drawings be revised to properly reflect the approved Contract Documents. The Architect or County may also require that the Contractor bear all costs under Article 4.5 and consequential damages associated with revising Plans and Specifications to accommodate the deviation from approved Plans and Specifications.

3.9.7.7 Extent of Review. In reviewing Shop Drawings, the Architect will not verify dimensions and field conditions. The Architect will review and approve Shop Drawings, Product Data, samples, etc., for aesthetics and for conformance with the design concept of the Work and the information

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in the Contract Documents. The Architect's review shall neither be construed as a complete check which relieves the Contractor, Subcontractor, manufacturer, fabricator, or supplier from responsibility for any deficiency that may exist or from any departures or deviations from the requirements of the Contract Documents unless the Contractor has, in writing, called the Architect's attention to the deviations at the time of submission. The Architect's review shall not relieve the Contractor or Subcontractors from responsibility for errors of any sort in Shop Drawings or schedules, for proper fitting of the Work, coordination of the differing Subcontractor trades and Shop Drawings and Work which is not indicated on the Shop Drawings at the time of submission of Shop Drawings. Contractor and Subcontractors shall be solely responsible for any quantities which may be shown on the Submittals or Contract Documents.

### **3.10 SUBSTITUTIONS**

#### **3.10.1 Definition**

A Substitution is a change in product, material, equipment, or method of construction from those required by the Construction Documents proposed by the Contractor. For this Project, a Substitution is subject to the filing of a Construction Substitution Request Form at the time of bid and meeting the requirements of this Article.

#### **3.10.2 One Product Specified**

Unless the Specifications state that no substitution is permitted, whenever the Contract Documents indicate any specific article, device, equipment, product, material, fixture, patented process, form, method, or type of construction or any specific name, make, trade name, or catalog number, with or without the words "or equal," such specification shall be deemed to be used for the purpose of facilitating description of the material, process, or article desired and shall be deemed to be followed by the words "or equal." Subject to the requirements of properly submitting a Substitution Request for as Addressed in Article 3.10.4, the Contractor may, unless otherwise stated, offer any material, process, article, etc., which shall be materially equal or better in every respect to that so indicated or specified ("Specified Item") and will completely accomplish the purpose of the Contract Documents.

#### **3.10.3 Products Specified Which Are Commercially Unavailable**

If the Contractor fails to make a request for substitutions for products, prior to the submission of its bid, and such products subsequently become commercially unavailable, the Contractor may request a substitution for such commercially unavailable item. The decision to grant this request is solely at the County's discretion. The written approval of the County, consistent with the procedure for Change Orders, shall be required for the use of a proposed substitute material. The County may condition its approval of the substitution upon the delivery to County of an extended warranty or other assurances of adequate performance of the substitution as well as an equitable deduction in the Contract Price should the substituted item cost less than the Specified Item. All risks of delay due the approval of a requested substitution by any AHJ shall be on the requesting party. All additional costs, AHJ review costs, all procurement and construction delays, and all costs for review by the Architect or its consultants shall be the responsibility of the Contractor and will be deducted from Contractor's pay request.

#### **3.10.4 Substitution Request Form**

Requests for substitutions of products, materials, or processes in place of a Specified Item must be in writing on the County's Substitution Request Form ("Request Form") at the time of submitting bids to the County, except as provided for in Article 3.10.3.

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The Request Form must be accompanied by evidence as to whether the proposed substitution:

- a. Is equal in quality/service/ability to the Specified Item;
- b. Will entail no changes in detail, construction, and scheduling of related work;
- c. Will be acceptable in consideration of the required design and artistic effect;
- d. Will provide no cost disadvantage to the County;
- e. Will require no excessive or more expensive maintenance, including adequacy and availability of replacement parts; and
- f. Will required no change of the construction schedule.

In completing the Request Form, the bidder must state, with respect to each requested substitution, whether the bidder will agree to provide the Specified Item in the event that the County denies the bidder's request for such requested substitution. In the event that the bidder has agreed in the Request Form to provide the Specified Item and the County denies the bidder's requested substitution for a Specified Item, the bidder shall provide the Specified Item without any additional cost or charge to the County.

After bids are opened, the apparent lowest bidder shall provide, within five (5) days of opening such bids, any and all Drawing, Specifications, samples, performance data, calculations, and other information, as may be required to assist the Architect, CM and the County in determining whether the proposed substitution is acceptable. The burden of establishing these facts shall be upon the bidder.

After the County's receipt of such evidence by the bidder, the County will make its final decision as to whether the bidder's request for substitution for any Specified Items will be granted. The decision as to whether a proposed request for substitution is equal to a Specified Item shall be at the sole discretion of the County. Any request for substitution that is granted by the County shall be documented and processed through a Change Order. Contractor must submit a complete Submittal of the requested substitution and a Shop Drawing showing configuration, dimensions, and other critical information associated with the substitution that meets the requirements of Article 3.9. The County may condition its approval of any substitution upon delivery to the County of an extended warranty or other assurances of adequate performance of the substitution. Any and all risks of delay due to approval by any governmental agency having jurisdiction shall be on the bidder.

If the Architect and County accept a proposed substitution, the Contractor agrees to pay for all AHJ review costs, engineering and design services, including, without limitation, compensation to the Architect and affected engineers for their required time to process such substitution through the agency having jurisdiction, if required, and to make all changes and adjustments in materials or the work of all trades directly or indirectly affected by the substituted item or items at no cost to the County.

### 3.10.5 Substitution Requests After Bid

The County, in its sole discretion, may accept a request for substitution by the Contractor or may request Contractor substitute a specified item. Any substitutions requested after bids are opened shall be subject to the same conditions and requirements set forth in Article 3.10.4 above. If any

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substitutions, that in the County or Architect's determination, results in a credit to the County, the credit amount shall be agreed upon in writing, otherwise, the request for substitution shall be deemed denied.

### **3.11 INTEGRATION OF WORK**

#### **3.11.1 Scope**

The Contractor shall be responsible for cutting, fitting, or patching to complete the Work and to make all parts fit together properly. Contractor shall be responsible for ensuring that all trades are coordinated and scheduled so as to ensure the timely and proper execution of the work. When modifying existing work or installing new Work adjacent to existing work, Contractor shall match, as closely as conditions of Site and materials will allow, the finishes, textures, and colors of the original work, refinishing existing work at no additional cost to County. All cost caused by defective or ill-timed work shall be borne by Contractor. 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.

#### **3.11.2 Structural Members**

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

#### **3.11.3 Subsequent Removal**

Permission to patch any areas or items of the Work shall not constitute a waiver of the County's or the Architect's right to require complete removal and replacement of the areas or items of the Work if, in the opinion of the Architect or the County, the patching does not satisfactorily restore quality and appearance of the Work or does not otherwise conform to the Contract Documents.

### **3.12 CLEANING UP**

#### **3.12.1 Contractor's Responsibility to Clean Up**

Contractor at all times shall keep premises free from debris such as waste, dust, excess water, storm water runoffs, rubbish, and excess materials and equipment. Contractor shall not leave debris under, in, or about the premises, but shall promptly remove same from the premises and dispose of it in a lawful manner. Disposal receipts or dump tickets shall be furnished to the Architect within five (5) days of request.

Contractor shall remove rubbish and debris resulting from the Work on a daily basis. Contractor shall maintain the structures and Site in a clean and orderly condition at all times until acceptance of the Project by the County. Contractor shall keep its access driveways and adjacent streets, sidewalks, gutters and drains free of rubbish, debris and excess water by cleaning and removal each day. All concrete, sidewalks, and paths of travel shall be broom cleaned daily.

#### **3.12.2 General Final Clean-Up**

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Upon completion of Work, Contractor shall employ experience workers or professional cleaners for final cleaning. Contractor shall clean each surface to the condition expected in a normal, commercial, building cleaning and maintenance program including, but not limited to, the performed of the following:

- a. Clean interior and exterior of buildings, including fixtures, equipment, walls, floors, ceilings, roofs, window sills and ledges, horizontal projections, and any areas where debris has collected, so surfaces are free from foreign material or discoloration;
- b. Clean the Project site. The grounds should be cleared of any Contractor equipment, raked clean of debris and trash removed. Sweep paved areas broom clean;
- c. Repair or replace any damaged materials. Replace any chipped or broken glass;
- d. Remove any and all stains;
- e. Remove labels that aren't permanent labels;
- f. Clean and polish all glass, plumbing fixtures, equipment, finish hardware and similar finish surfaces. Remove any glazing compounds;
- g. Remove temporary utilities, fencing, barricades, planking, sanitary facilities and similar temporary facilities from Site;
- h. Remove temporary film that remains on any hardware, doors or other surfaces; and
- i. Seal the bottom and tops of all doors.

### 3.12.3 Special Clean-Up.

In addition to the general cleaning, the following special cleaning shall be done at the completion of the Work in accordance with the Specifications including, but not limited to:

- a. Remove putty stains from glazing, then wash and polish glazing;
- b. Remove marks, stains, fingerprints and other soil or dirt from painted, stained or decorated work;
- c. Remove temporary protection and clean and polish floors and waxed surfaces;
- d. Clean and polish hardware and plumbing trim; remove stains, dust, dirt, plaster and paint;
- e. Wipe surfaces of mechanical and electrical equipment;
- f. Remove spots, soil, plaster and paint from tile work, and wash tile;

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- g. Clean all fixtures and equipment, remove excess lubrication, clean light fixtures and lamps, polish metal surfaces;
- h. Vacuum-clean carpeted surfaces; and
- i. Remove debris from roofs, down spout and drainage system.

### 3.12.4 Failure to Cleanup

If the Contractor fails to clean up as provided in the Contract Documents, the County may do so, and the cost thereof shall be the responsibility of the Contractor pursuant to Article 2.2 and seek a Deductive Change Order.

## **3.13 ACCESS TO WORK**

The Contractor shall provide the County, the Architect, Engineers and the Project Inspector, access to the Work in preparation and progress wherever located. Contractor shall provide safe and proper facilities for such access so that County's representatives may perform their functions.

CONTRACTOR IS AWARE THAT THIS CONTRACT MAY BE SPLIT INTO SEVERAL PHASES AS ADDRESSED IN ARTICLE 6.

### 3.13.1 Special Inspection, Inspections or Tests Out of State, Out of Country or Remote from Project

If Contractor has a Subcontractor or supplier that requires in-plant or special inspections or inspections or tests that are out of the country, out of the state, or a distance of more than 200 miles from the Project site, the Special Inspector or Inspector shall be provided access so the special inspection or inspection may occur in the remote location. In some cases, the Inspector may also require access in addition to Special Inspectors and individuals performing tests. Inspections/tests shall occur during normal work hours. (See also Article 4.3.6)

## **3.14 ROYALTIES AND PATENTS**

### 3.14.1 Payment and Indemnity for Infringement

Contractor shall hold and save the County and its officers, agents, and employees, the Construction Manager, the Architect, and the Architect's consultants harmless from liability of any nature or kind, including cost and expense, for or on account of any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the County, unless otherwise specifically provided in the Contract Documents, and unless such liability arises from the sole negligence, or active negligence, or willful misconduct of the County, the Architect, or the Architect's consultants.

### 3.14.2 Review

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

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### **3.15 INDEMNIFICATION**

#### **3.15.1 Contractor**

See Agreement Form. Contractor shall ensure that its contract with each of its Subcontractors contains provisions requiring the Subcontractors to defend, indemnify and hold harmless the County, Architect, Inspector, the State of California to a minimum level as set forth in this Article and consistent with the indemnity and hold harmless language in the Agreement Form.

The Contractor's and Subcontractors' obligation to defend, indemnify and hold harmless the County, Architect, Inspector, the State of California and their officers, employees, agents and independent contractors hereunder shall include, without limitation, any and all claims, damages, and costs for the following: (1) any damages or injury to or death of any person, and damage or injury to, loss (including theft), or loss of use of, any property; (2) breach of any warranty, express or implied; (3) failure of the Contractor or Subcontractors to comply with any applicable governmental law, rule, regulation, or other requirement; (4) products installed in or used in connection with the Work; and (5) any claims of violation of the Americans with Disabilities Act ("ADA")

### **3.16 SUBMISSION OF DAILY REPORTS**

#### **3.16.1 General**

By 10:00 a.m. on the following business day, the Contractor shall submit a Daily Report to the Inspector and copy the Architect for the previous day's Work. If there is a Construction Manager, the original Daily Report is to be provided to the Construction Manager and copies sent to the Architect and the Inspector. Daily Reports shall be prepared on forms approved by the County, together with applicable delivery tickets, listing all labor, materials, and equipment involved for that day. The County reserves the right to note inconsistencies or inaccuracies in the Daily Reports. In such cases, pertinent notes shall be entered by each party to explain points which cannot be resolved that day. Each party shall retain a signed copy of the report. Daily Reports by Subcontractors or others shall be submitted through the Contractor.

#### **3.16.2 Labor**

The Daily Report shall show names of workers, classifications, hours worked and hourly rate. The locations where work occurred shall also be identified in the Daily Report. Project superintendent expenses are not allowed.

#### **3.16.3 Materials**

The Daily Report required shall describe and list quantities of materials used and unit costs.

#### **3.16.4 Equipment**

The Daily Report required shall show type of equipment, size, identification number, and hours of operation, including loading and transportation, if applicable, and hourly/daily cost. Move-on and move-off fees shall be noted.

#### **3.16.5 Other Services and Expenditures**



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Other services and expenditures shall be described in the Daily Report in detail as the County requires.

### **3.16.6 Failure to Submit Daily Report**

If Contractor does not submit its Daily Report by 10 am the next business day, the Project Inspector shall prepare a Daily Report addressing each of the above items. The cost for the Inspector's services to prepare the Daily Report shall be addressed through a Deductive Change Order under Article 7.7.4.

## **3.17 AS-BUILT DRAWINGS AND ANNOTATED SPECIFICATIONS**

Throughout the duration of the Project, Contractor shall maintain on a current basis an accurate and complete set of As-Built Drawings (and Annotated Specifications) clearly showing all changes, revisions to Specifications and substitutions during construction, including, without limitation, field changes and the final location of all electrical and mechanical equipment, utility lines, ducts, outlets, structural members, walls, partitions, and other significant features. In case a Specification allows Contractor to elect one of several brands, makes, or types of material or equipment, the annotations shall show which of the allowable items the Contractor has furnished. The Contractor will update the As-Built Drawings and Annotated Specifications as often as necessary to keep them current, but no less often than weekly.

Contractor shall update As-Built Drawings with complete information on an area of Work at or near the time when the Work is being performed and prior to any Work being covered.

The As-Built Drawings and Annotated Specifications shall be kept at the Site and available for review and inspection by the County and the Architect. Failure to maintain and update the As-Built Drawings is a basis to withhold Progress Payments pursuant to Article 9.6.

### **3.17.1 Upon Beneficial Occupancy**

Contractor shall obtain and pay for reproducible Plans upon Beneficial Occupancy. Contractor shall deliver Plans to County Representative (Construction Manager if one is hired for the Project).

### **3.17.2 As-Built at Completion of Work**

Upon completion of the Work and prior to and as a condition precedent to Application for Retention Payment, the Contractor will provide one neatly prepared and complete set of As-Built Drawings and Annotated Specifications to the County. Contractor shall certify the As-Built as a complete and accurate reflection of the actual construction conditions of the Work by affixing a stamp indicating the Drawings are As-Built and certifying accuracy on the final set of As-Built. Failure to deliver a complete As-Built set of Drawings may result in significant withholdings to ensure Work is properly documented. (See Article 9.9.2)

### **3.17.3 Log of Control and Survey Documentation**

Contractor shall complete and maintain an accurate log or all control and survey documentation for the Project as the Work progresses. All reference and control points shall be recorded on the As-Built Drawings. The basis of elevations shall be one of the established benchmarks that must be maintained on the As-Built.

## **GENERAL CONDITIONS**

### **3.17.4 Record Coordinates for Key Items**

Contractor shall record, by coordinates, all utilities on-site with top of pipe elevations, major grade and alignment changes, rim, grate or top of curb and flow line elevations of all drainage structures and sewer manholes. Contractor shall update record information at or near the time when work is occurring in an area and prior to covering the Work.

### **3.17.5 BIM As-Built Drawings**

If BIM is utilized for the Project, then an electronic version of such As-Built Drawings and Annotated Specifications will be delivered to County (in an acceptable format to County).

## **3.18 EQUIPMENT MANUALS**

Contractor shall obtain and furnish three (3) complete sets of manuals containing the manufacturers' instructions for maintenance and operation of each item of equipment and apparatus furnished under the Contract Documents and any additional data specifically requested under the various sections of the Specifications for each division of the Work. The manuals shall be arranged in logical, sequential order, labeled, indexed, and placed in three-ring binders. At the completion of its Work, the Contractor shall certify, by endorsement thereon, that each of the manuals is complete, accurate, and covers all of its Work. Prior to submittal of Contractor's Application for Retention Payment, and as a further condition to its approval by the Architect, each Subcontractor shall deliver the manuals, arranged in logical, sequential order, labeled, indexed, endorsed, and placed in three-ring binders, to the Contractor, who shall assemble these manuals for all divisions of the Work, review them for completeness, and submit them to the County through the Architect.

## **3.19 DIR REGISTRATION**

Strict compliance with all DIR registration requirements in accordance with Labor Code sections 1725.5 and 1771.1 is a material obligation of the Contractor and all of its subcontractors (of any tier) under the Contract Documents. The foregoing includes, without limitation, compliance with DIR registration requirements at all times during performance of the Work by the Contractor and all of its subcontractors of any tier. The failure of the Contractor and all subcontractors of any tier to be properly registered with DIR at all times during performance of the Work is a material breach of the Contract and subject to termination for cause.

An affirmative and ongoing obligation of the Contractor under the Contract Documents is the verification that all subcontractors of any tier are at all times during performance of the Work in full and strict compliance with the DIR registration requirements. The Contractor shall not permit or allow any subcontractor of any tier to perform any Work without the Contractor's verification that all subcontractors are in full and strict compliance with the DIR registration requirements. Any subcontractors of any tier not properly registered with DIR shall be substituted in accordance with Labor Code section 1771.1. Contractor or its subcontractors of any tier shall not be entitled to any additional costs or time arising from or in any way related to compliance with the DIR registration requirements.

# **GENERAL CONDITIONS**

## **ARTICLE 4 ADMINISTRATION OF THE CONTRACT AND CLAIMS**

### **4.1 ARCHITECT**

#### **4.1.1 Replacement of Architect**

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

### **4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT**

#### **4.2.1 Status**

The Architect will provide administration of the Contract Documents and the Work, and will be the County's representative during construction, as well as during the one (1) year period following the commencement of any warranties. The Architect will have authority to act on behalf of the County only to the extent provided in the Contract Documents.

#### **4.2.2 Site Visits**

The Architect will visit the Site at intervals necessary in the judgment of the Architect to become generally familiar with the progress and quality of the Work and to determine in general if the Work is being performed in accordance with the Contract Documents and as otherwise required by the AHJ.

#### **4.2.3 Limitations of Construction Responsibility**

The Architect, County and CM shall not have control over, charge of, or be responsible for construction means, methods, techniques, schedules, sequences or procedures, fabrication, procurement, shipment, delivery, receipt, installation, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility under the Contract Documents. The Architect, County and CM shall not be responsible for the Contractor's, Subcontractors', material or equipment suppliers', or any other person's schedules or failure to carry out the Work in accordance with the Contract Documents. The Architect, County and CM shall not have control over or charge of acts or omissions of the Contractor, Subcontractors, their agents or employees, or any other persons or entities performing or supplying portions of the Work. The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect, County or CM in the Architect, County or CM's administration of the Contract Documents, or by tests, inspections, or approvals required or performed by persons other than the Contractor.

#### **4.2.4 Communications Facilitating Contract Administration**

Except where a CM is on the Project, or as otherwise provided in the Contract Documents or when direct communications are warranted by special circumstances, the County and the Contractor shall communicate through the Architect. In the cases where a CM is hired for the Project, all communication shall be through the CM (unless otherwise directed) with copies to the County, Architect and Inspector.

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Where direct communication is necessary between the County and the Contractor, the County's communication shall be through the County's authorized designated person. The Architect and CM shall be promptly informed, and shall receive copies of all written communications. Contractor shall not rely upon any communications from the County that is not from the County's Representative. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material or equipment suppliers shall be through the Contractor. In the case where a CM is hired for the Project, the CM shall be the main point of contact for communication of information. Copies should be sent to the Architect, County Representative and Inspector.

### 4.2.5 Payment Applications

The Architect will review and make recommendations to the County regarding the amounts due the Contractor on the Certificates for Payment pursuant to Article 9.3.4 and subject to the Inspector's review, (CM review, if applicable) and Architect's observation. This review of Payment Applications is sometimes called a "Pencil Draft." Return of a Pencil Draft shall constitute the County's dispute of the Payment Application that has been submitted. Contractor shall promptly respond to Pencil Drafts or Contractor's Payment Applications may be delayed. Contractor's failure to promptly respond to a Pencil Draft shall qualify as a delay in the Prompt Payment of a Request for Payment or Request for Retention.

### 4.2.6 Rejection of Work

In addition to the rights, duties, and obligations of the Inspector under this Article, the Architect may recommend to the County that the County reject Work which does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable to achieve the intent of the Contract Documents, the Architect (and/or CM) may recommend to the County that the County require additional inspection or testing of the Work in accordance with Article 13.5, whether or not such Work is Fabricated, installed, or completed. County may have Non-conforming Work removed and replaced pursuant to Article 9.7. However, neither this authority of the Architect (or CM) nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect (or CM) to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.

Contractor shall, without charge, replace or correct Work found by the County to not be in conformance to Contract requirements. Contractor shall promptly segregate and remove rejected materials from the Project site.

This section does not address a Notice of Non-Compliance and the remedies associated with a Notice of Non-Compliance which are addressed at Article 7.1.2

### 4.2.7 Warranties upon Completion

The Architect (and where applicable CM), in conjunction with the Inspector will conduct field reviews of the Work to determine the date of Substantial Completion and of Final Completion, shall receive and forward to the County for the County's review written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment when the Architect believes the Work has been completed in compliance with the requirements of the Contract Documents (See Article 9.11 for Close-Out). The handling by the Architect (or where applicable CM) of such warranties, maintenance manuals, or similar documents shall not diminish or transfer to the Architect any responsibilities or liabilities required by the Contract Documents of the Contractor or other entities, parties, or persons performing or supplying the Work.

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On some Projects, the County will take a phased occupancy of the Project. In those cases, the County may commence the running of warranties on the buildings, or phases that are accepted after Punch List is completed and the County has accepted Completion of the separate phase. A separate Notice of Completion may be filed for the separate building or phase of work and warranties shall commence for the separate phase only to the extent that warranties do not require coordination or connection to other buildings or other parts of the site and only if the warranted item is completed to its entirety in the segregated building or phased area.

If written warranties are not provided at the time the Punch List is nearing completion, Architect (with recommendations from the CM and Inspector) shall determine the dollar value of the warranties and shall make recommendation for withholdings necessary to effectuate the transfer of such warranties to the County for future use as part of the Punch List for the Project pursuant to Article 9.6.

Warranties are not commenced through utilizing of equipment for testing and operation as necessary to acclimate buildings or where necessary to test systems.

### 4.2.8 Interpretation

The Architect will interpret and decide matters concerning performance and requirements of the Contract Documents. Architect shall make clarifications as necessary to interpret the Contract Documents.

## 4.3 **PROJECT INSPECTOR**

### 4.3.1 General

One or more Project Inspectors employed by the County will be assigned to the Work.

### 4.3.2 Inspector's Duties and Timelines for Inspection

All Work shall be under the observation of the Inspector. Contractor shall establish a protocol for requesting inspection with Inspector so as to not delay the Work and provide adequate time for the Inspector to perform inspection. If such a protocol is not established ahead of time, Inspector may utilize the time criteria set by Title 24 of 48 hours in advance for each new area. The Inspector shall have free access to any or all parts of the Work at any time. The Contractor shall furnish the Inspector such information as may be necessary to keep the Inspector fully informed regarding progress and manner of Work and character of materials. Such observations shall not, in any way, relieve the Contractor from responsibility for full compliance with all terms and conditions of the Contract, or be construed to lessen to any degree the Contractor's responsibility for providing efficient and capable superintendence. The Inspector is not authorized to make changes in the Drawings or Specifications nor shall the Inspector's approval of the Work and methods relieve the Contractor of responsibility for the correction of subsequently discovered defects, or from its obligation to comply with the Contract Documents.

Inspector shall electronically post AHJ required documents on the AHJ electronic posting website, if applicable. It is the Contractor's responsibility to determine the status of posting and determine if all the criteria for sign off of a category of Work.

Inspector may collaborate with Contractor about approval of areas that may be constructed and approved incrementally. Inspector shall work with Contractor to present incremental approval proposals to the AHJ.

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### 4.3.3 Inspector's Authority to Reject or Stop Work

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

### 4.3.4 Inspector's Facilities

Within seven (7) days after the notice to proceed, the Contractor shall provide the Inspector with the temporary facilities as required. More specific requirements for the Inspector facilities may be further described under Division 1 of the Specifications.

### 4.3.5 Testing Times

The County will provide inspection and testing at its cost during the normal eight (8) hour day Monday through Friday (except holidays). Work by the Contractor outside of the normal eight (8) hour day shall constitute an authorization from the Contractor to the County to provide inspection and testing as required outside of the normal eight (8) hour day. Contractor shall provide adequate time for inspections so as to not delay the Work. An advanced timing protocol may be established pursuant to Article 4.3.2. If the Contractor is behind Schedule then it is incumbent on the Contractor to provide advance forecast through look ahead of the anticipated date for inspection so the Inspector may plan their activities so as to not delay the Project. Contractor shall reimburse County for any additional costs associated with inspection and testing (including re-inspection and re-testing) outside the normal eight-hour day and for any retests caused by the Contractor.

It is the Contractor's responsibility to request special inspections with sufficient time so all testing may be timely completed and posted so work may proceed. Specifically, timely request for special inspection under the AHJ. Failure to plan and pay (if applicable) for quicker delivery of Special Inspections may be counted as Float, but is not considered Governmental Delay Float under Article 8.1.4.

### 4.3.6 Special Inspections, Inspections or Tests Out of State, Out of Country or Remote from Project

If Contractor has a Subcontractor or supplier that requires in plant or special inspections, inspections or tests that are out of the country, out of the state or a distance of more than 200 miles from the Project Site, the County shall provide the Special Inspector or individual performing tests time for inspection and testing during normal work hours. Contractor, however, is responsible for the cost of travel, housing, food, out of area premiums that may be in the Inspector/Testing Agreement with County, or other expenses necessary to ensure proper inspection, special inspection or testing is provided by a Project Inspector, Special Inspector, or individual performing tests. In some cases all three (Project Inspector, Special Inspector, and Tester) may be required. In addition, if the Project Inspector, Special Inspector, or individual performing test has contractual travel clauses or special rates for out of town inspection, Contractor is responsible for all costs associated with the contractual travel costs in addition to all other costs. Arrangements for inspection and/or testing shall be made far enough in advance so as to not delay the Work.

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### **4.4 STOP WORK ORDER**

AHJ may issue a Stop Work Order, or an Order to Comply, when either (1) the Work proceeds without AHJ approval; (2) the Work proceeds without a Project Inspector, or (3) where AHJ determines that the Work is not being performed in accordance with applicable rules and regulations, and would compromise the structural integrity of the Project or would endanger lives. If a Stop Work Order is issued, the Work in the affected area shall cease until AHJ withdraws the Stop Work Order. The County shall not be held liable in any action filed against the County for any delays caused by compliance with the Stop Work Order, except to the extent that an error or omission by the County is the basis for the issuance of the Stop Work Order.

Examples of Stop Work Orders that may be issued by AHJ include the installation of automatic fire sprinkler systems without approved Plans, covering Work that has not been approved by the AHJ Inspector.

### **4.5 RESPONSIBILITY FOR ADDITIONAL CHARGES INCURRED BY THE COUNTY FOR PROFESSIONAL SERVICES**

If at any time prior to the completion of the requirements under the Contract Documents, the County is required to provide or secure additional professional services (including CM, Inspection, Architect, Engineering and Special Consultant Services) for any reason by any act of the Contractor, the County may seek a Deductive Change Order for any costs incurred for any such additional services, which costs shall be deducted from the next progress payment. A Deductive Change Order shall be independent from any other County remedies and shall not be considered a waiver of any County rights or remedies. If payments then or thereafter due to the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the County. Additional services shall include, but shall not be limited to, the following:

- a. Services made necessary by the default of the Contractor (Article 14 or Article 2.2).
- b. Services made necessary due to the defects or deficiencies in the Work of the Contractor (Article 2.2 and Article 9.6).
- c. Spurious or frivolous RFI's issued that do not conform to the requirements of Article 7.4. Issuance of the same RFI after receiving an answer from the Architect or Engineer
- d. Review of Schedules that are provided by Contractor that do not Conform with the Requirements of Article 8.
- e. Preparation of a CCD or ICD to correct a Contractor Deficiency, or Contractor Caused Notice of Non-Compliance (See Article 7.3).
- f. Review of Incomplete Shop Drawings or Submittals, including the submission of Piecemeal Shop Drawings or Submittals unless piecemeal Submittals are specifically agreed upon by County (See Article 3.9)
- g. Services required by failure of the Contractor to perform according to any provision of the Contract Documents.
- h. Services in connection with evaluating substitutions of products, materials, equipment, Subcontractors proposed by the Contractor, and making subsequent revisions to Drawings,

## **GENERAL CONDITIONS**

Specifications, obtaining AHJ approvals, AHJ costs for review of changes made during construction, other governmental agency review costs, and providing other documentation required (except for the situation where the specified item is no longer manufactured or available). (See Article 3.10)

- i. Services for evaluating and processing Claims or Disputes submitted by the Contractor in connection with the Work outside the established Change Order process.
- j. Services required by the failure of the Contractor to prosecute the Work in a timely manner in compliance within the specified time of completion.
- k. Services in conjunction with the testing, adjusting, balancing and start-up of equipment other than the normal amount customarily associated for the type of Work involved.
- l. Services in conjunction with more than one (1) re-review of Submittals of Shop Drawings, Product Data, samples, RFI's etc.

### **4.6 DISPUTES AND CLAIMS**

#### **4.6.1 Decision of Architect**

“Disputes” or “Claims” as defined in Article 4.6.9.1 between County and Contractor involving money or time, including those alleging an error or omission by the Architect shall be referred initially to the Architect for action as provided in Article 4.6.2 within ten (10) days after Contractor’s Article 7 request for Change is denied. If there is a CM, the CM shall receive the Dispute and may review and also assemble opinions and documents to assist the Architect. A decision by the Architect, as provided in Article 4.6.5, shall be required as a condition precedent to proceeding with remedies set forth in Article 4.6.9 as to all such matters arising prior to the date Retention Payment Application is due, regardless of whether such matters relate to execution and progress of the Work, or the extent to which the Work has reached Final Completion.

The condition precedent of an Architect decision shall be waived if: (1) the position of Architect is vacant; (2) the Architect has failed to take action required under Article 4.6.5 within the time periods required therein; or (3) the Dispute or Claim relates to a stop notice claim not arising from any extra Change Order or Immediate Change Directive for which approval has not been provided.

#### **4.6.2 Architect’s Review**

The Architect (and CM) will review the Dispute and take one or more of the following preliminary actions upon receipt of a Dispute: (1) request additional supporting data from the claimant; (2) submit a schedule to the parties indicating when the Architect expects to take action; (3) reject the Dispute in whole or in part, stating reasons for rejection; (4) recommend approval of the Dispute; or (5) suggest a compromise. The Architect may also, but is not obligated to, notify the Surety, if any, of the nature and amount of the Dispute.

4.6.2.1 *Architectural Immunity.* Architect review of Disputes and Claims shall be impartial and meant to resolve Disputes and Claims. Pursuant to the case, Huber, Hunt & Nichols, Inc. v. Moore (1977) 67 Cal.App.3d 278, the Architect is provided a quasi-judicial immunity for interpreting and deciding Disputes and Claims between the County and Contractor.



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### 4.6.3 Documentation if Resolved

If a Dispute has been resolved, the Architect (and/or CM) will prepare a Change Order or obtain appropriate documentation to document the terms for Superintendent approval.

### 4.6.4 Actions if Not Resolved

If a Dispute has not been resolved and all documentation requested pursuant to Article 4.6.2 has been provided, the Contractor shall, within ten (10) days after the Architect's initial response, assemble all the documents involved in the Dispute including copies of all back-up documentation of costs and the basis for the Dispute and take one or more of the following actions: (1) modify the initial Dispute; (2) notify the Architect that the initial Dispute stands; or (3) supplement with additional supporting data and re-submit to the Architect under Article 4.6.2.

### 4.6.5 Architect's Written Decision

If a Dispute has not been resolved after consideration of the foregoing and of other evidence presented by the parties or requested by the Architect, the Architect (or Architect through CM) shall provide a written decision twenty (20) days after compliance with Article 4.6.4. Upon expiration of such time period, the Architect (or Architect through CM) will render to the parties its written decision relative to the Dispute, including any change in the Contract Sum or Contract Time or both. The Architect may also request reasonable additional time to complete Architect's written decision.

If the resolution of the Dispute by the Architect is not satisfactory to the Contractor and copies of all back-up documentation of costs and the basis for the Dispute is fully articulated in a package of material that is complete, the Contractor may then submit a Claim to the County under Article 4.6.9.

### 4.6.6 Continuing Contract Performance

Pending final resolution of a Dispute or Claim, including, negotiation, mediation, arbitration, or litigation, the Contractor shall proceed diligently with performance of the Contract, and the County shall continue to make any undisputed payments in accordance with the Contract (less any withholdings or offsets). If the Claim is not resolved, Contractor agrees it will neither rescind the Contract nor stop the progress of the work, but Contractor's sole remedy shall be to submit such controversy to determination by a court of competent jurisdiction in the county where the Project is located, after the Project has been completed, and not before.

4.6.6.1 *County's Option to Submit Individual Disputes to Arbitration during Claims and Disputes Process.* At the County's sole option, in order to more efficiently resolve Claims during the Project and prior to the completion of the Claims Process, pursuant to Government Code section 9201, the County may submit individual Disputes or Claims for binding arbitration and Contractor agrees to the resolution of for each individual Dispute or Claim by an Arbitrator, including resolution of time and delays. If binding arbitration is utilized for individual Disputes or Claims, such resolution is full and final as to that particular Dispute or Claim. THIS INDIVIDUAL DISPUTE ARBITRATION PROCESS IS NOT AN ARBITRATION CLAUSE AND SHALL NOT BE CONSTRUED AS AN AGREEMENT TO ARBITRATE. THIS INDIVIDUAL DISPUTES ARBITRATION PROCESS IS FOR THE SOLE PURPOSE OF STREAMLINING AND RESOLVING DISPUTES OR CLAIMS DURING CONSTRUCTION AND SHALL BE REQUESTED ON SPECIFIC INDIVIDUAL ITEMS BY THE COUNTY PRIOR TO RETENTION PAYMENT (EVEN IF THERE ARE DEDUCTIONS MADE FROM RETENTION PAYMENT) WHICH REPRESENTS THE FINAL COMPLETION OF THE PROJECT.

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- a. If there is no Retention remaining on the Project, individual Disputes initiated prior to Project Final Completion shall continue until a final disposition of the Arbitration or resolution of the individual Claim or Dispute.
- b. No Tolling. The Arbitration process shall not toll the Disputes or Claims process under Article 4.6 or the requirement to submit Claims to Court under Article 4.6.9.5.

### 4.6.7 Claims for Concealed Trenches or Excavations Greater Than Four Feet Below the Surface

When any excavation or trenching extends greater than four feet below the surface or if any condition involving hazardous substances are encountered:

- a. Immediately upon discovery, The Contractor shall promptly, and before the following conditions are disturbed, notify the County, by telephone and in writing, of the condition except:
  1. If such condition is a hazardous waste condition, Contractor's bid includes removal or disposal of hazardous substances. Material that the Contractor believes may be a material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, is required to be removed to a Class I, Class II, or Class III disposal site in accordance with the provisions of existing law. In such case, the notice bulletin procedures of Article 7 apply.
  2. Subsurface or latent physical conditions at the Site differing from those indicated in the Drawings, Specifications, Soils Report, and from Contractor's own investigation under Article 2.1.
  3. Unknown physical conditions at the Site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Contract.
- b. The County shall investigate the conditions, and if County finds that the conditions do materially so differ, do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work shall issue a Change Order or Construction Change Document under the procedures described in the Contract.
- c. In the event that a dispute arises between the public entity or County and the Contractor whether the conditions materially differ, involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled Completion Date provided for by the Contract, but shall proceed with all Work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

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### 4.6.8 Dispute Concerning Extension of Time.

If Contractor and County cannot agree upon an extension of time, whether compensable or not, then Contractor must have first completed the procedures set forth in Article 8.4. Upon completion of the procedures set forth under Article 8.4, Contractor must then comply with the requirements in this Article including those set forth under Article 4.6.9.

### 4.6.9 Claims Procedures

Pursuant to the remedies under Public Contract Code section 9201 and Government Code section 930.2, Contractor, through execution of this Agreement, also agrees to comply with the Claims requirements of Article 4.6 to quickly and efficiently resolve Disputes and Claims. Further, to provide a level of accuracy to the records submitted, the County shall have the right to audit books and records pursuant to Article 13.11 based on the actual costs incurred and to reduce the uncertainty in resolving Disputes and Claims with limited information.

#### 4.6.9.1 *Procedure Applicable to All Claims*

- a. Definition of Claim: A “Claim” is where a Dispute between the parties rises to the level where backup documentation is assembled and provided to the County as a separate demand by the Contractor for: (1) a time extension, including, without limitation, for relief from damages or penalties for delay assessed by the County under the Contract; (2) payment by the County of money or damages arising from Work done by, or on behalf of, the Contractor pursuant to the Contract and payment for which is not otherwise expressly provided for or to which the Contractor is not otherwise entitled to; or (3) an amount of payment disputed by the County. If the Claim is for damages associated with a Stop Work Order, the Contractor shall not be entitled to a request for Compensation, but shall be entitled to utilize Governmental Delay Float (See Article 8.1.4.1.)
- b. Filing Claim Is Not Basis to Discontinue Work: The Contractor shall promptly comply with Work under the Contract or Work requested by the County even though a written Claim has been filed. The Contractor and the County shall make good faith efforts to resolve any and all Claims that may arise during the performance of the Work covered by this Contract.
- c. Claim Notification: The Contractor shall within seven (7) calendar days after the written decision of the Architect, or if the time period for Architect’s decision has passed under Article 4.6.5, submit a notification in writing sent by registered mail or certified mail with return receipt requested, with the County (and the County’s CM) stating clearly the basis for the Claim and including all relevant and required documents. If the notification is not submitted within seven (7) days after the written decision of the Architect or the passage of time under Article 4.6.5, the Contractor shall be deemed to have waived all right to assert the Claim, and the Claim shall be denied. Claims submitted after the Retention Payment date shall also be considered null and void by the County. All Claims shall be reviewed pursuant to Articles 4.6.1 through 4.6.5.

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The Formal Notification of Claim must be presented as follows:

- (1) The term “Claim” must be at the top of the page in no smaller than 20 point writing.
  - (2) All documentation submitted pursuant to Article 4.6 to the Architect shall be submitted with the “Claim.”
  - (3) A stack of documents, copy of all Project documents, or the submission of random documents shall not constitute an adequate reference to supporting documentation.
  - (4) Any additional or supporting documentation that Contractor believes is relevant should be submitted at this time.
- d. Reasonable Documents to Support Claim: The Contractor shall furnish reasonable documentation to support the Claim. The Contractor shall provide all written detailed documentation which supports the Claim, including but not limited to: arguments, justifications, cost, estimates, Schedule analysis and detailed documentation. The format of the required reasonable documentation to support the Claim shall include, without limitation:
1. Cover letter.
  2. Summary of factual basis of Claim and amount of Claim.
  3. Summary of the basis of the Claim, including the specific clause and section under the Contract under which the Claim is made.
  4. Documents relating to the Claim, including:
    - a. Specifications sections in question.
    - b. Relevant portions of the Drawings
    - c. Applicable Clarifications (RFI's)
    - d. Other relevant information, including responses that were received.
    - e. Contractor Analysis of Claim merit.
      - (a) Contractor's analysis of any Subcontractor vendor Claims that are being passed through.
      - (b) Any analysis performed by outside consultants
      - (c) Any legal analysis that Contractor deems relevant
    - f. Break down of all costs associated with the Claim.
    - g. For Claims relating to time extensions, an analysis and supporting documentation evidencing any effect upon the critical path in conformance with the requirements of Article 8.4 chronology of events and related correspondence.
    - h. Applicable Daily Reports and logs.

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- (a) If the Daily Reports or Logs are not available, lost or destroyed, there shall be a presumption that the lost documentation was unfavorable to the Contractor. See California Civil Jury Instruction 204.
  - i. For Claims involving overhead, cost escalation, acceleration, disruption or increased costs, a full version of job costs reports organized by category of work or Schedule of Values with budget information tracked against actual costs. Any and all supporting back-up data, including the original bid (and associated original unaltered metadata).
    - (a) The metadata and bid information shall be provided confidentially and subject to a protective order to prevent dissemination to other contractors or to the public. However, the bid documentation should remain intact and available for review and inspection in case of this type of increased cost Claim.
    - (b) This data on the bid shall be made available to any County attorneys or experts and shall also be utilized as evidence for any legal proceedings.
    - (c) If the bid documentation is not available, lost or destroyed, there shall be a presumption that the lost bid documentation was unfavorable to the Contractor. See California Civil Jury Instruction 204.
- e. Certification: The Contractor (and Subcontractors, if applicable) shall submit with the Claim a certification under penalty of perjury:
  - 1. That the Contractor has reviewed the Claim and that such Claim is made in good faith;
  - 2. Supporting data are accurate and complete to the best of the Contractor's knowledge and belief;
  - 3. The amount requested accurately reflects the amount of compensation for which the Contractor believes the County is liable.
  - 4. That the Contractor is familiar with Government Code sections 12650 et seq. and Penal Code section 72 and that false claims can lead to substantial fines and/or imprisonment.
- f. Signature of Certification: If the Contractor is not an individual, the certification shall be executed by an officer or general partner of the Contractor having overall responsibility for the conduct of the Contractor's affairs.

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- g. Upon receipt of a Claim and all supporting documents as required above, the County shall conduct a reasonable review of the Claim and, within a period not to exceed 45 days, shall provide the Contractor a written statement identifying what portion of the Claim is disputed and what portion is undisputed. Upon receipt of a Claim, the County and Contractor may, by mutual agreement, extend the time period provided in this paragraph.
- h. If the County needs approval from its Superintendent to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the Claim, and the Superintendent does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a Claim sent by registered mail or certified mail, return receipt requested, the County shall have up to three days following the next duly publicly noticed meeting of the Superintendent after the 45-day period, or extension, expires to provide the Contractor a written statement identifying the disputed portion and the undisputed portion.
- i. Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the County issues its written statement. If the County fails to issue a written statement, paragraph o below shall apply.
- j. If the Contractor disputes the County's written response, or if the County fails to respond to a Claim issued pursuant to this Article 4.6.9 within the time prescribed, the 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, the County shall schedule a meet and confer conference within 30 days for settlement of the Claim.
- k. Within 10 business days following the conclusion of the meet and confer conference, if the Claim or any portion of the Claim remains in dispute, the County shall provide the 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 the County issues its written statement. Any disputed portion of the Claim, as identified by the Contractor in writing, shall be submitted to nonbinding mediation, with the County and the Contractor sharing the associated costs equally. The County 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 in Article 4.6.9.5.

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- l. For purposes of this Article 4.6.9, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.
- m. Unless otherwise agreed to by the County and the Contractor in writing, the mediation conducted pursuant to this Article 4.6.9 shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.
- n. This Claims process does not preclude the County from requiring arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program, if mediation under this Article 4.6.9 does not resolve the parties' Claim. This Claims process does not preclude the County from submitting individual Disputes or Claims to binding arbitration pursuant to Article 4.6.9.4 below.
- o. Failure by the County to respond to a Claim from the Contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this Article 4.6.9 shall result in the Claim being deemed rejected in its entirety. A Claim that is denied by reason of the County's failure to have responded to a Claim, or its failure to otherwise meet the time requirements of this Article 4.6.9, shall not constitute an adverse finding with regard to the merits of the Claim or the responsibility or qualifications of the Contractor.
- p. If a subcontractor or a lower tier subcontractor lacks legal standing to assert a Claim against a County because privity of contract does not exist, the Contractor may present to the County a Claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the Contractor present a Claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the Claim be presented to the County shall furnish reasonable documentation to support the Claim. Within 45 days of receipt of this written request, the Contractor shall notify the subcontractor in writing as to whether the Contractor presented the Claim to the County and, if the Contractor did not present the Claim, provide the subcontractor with a statement of the reasons for not having done so.
- q. Upon receipt of a Claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable.
- r. The Contractor's Claim shall be denied if it fails to follow the requirements of this Article.

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4.6.9.2 *County (through CM or County's Agent or Attorney) May Request Additional Information.* Within thirty (30) days of receipt of the Claim and the information under this Article, the County may request in writing any additional documentation supporting the Claim or documentation relating to defenses to the Claim which the County may assert. If additional documents are required, the time in which the Claim is evaluated may be extended by a reasonable time so the Claim and additional documents may be reviewed.

4.6.9.3 *Claims Procedures in Addition to Government Code Claim.* Nothing in the Claims procedures set forth in this Article 4 of the General Conditions shall act to waive or relieve the Contractor from meeting the requirements set forth in Government Code section 900 et seq.

4.6.9.4 *Binding Arbitration of Individual Claim Issues.* To expedite resolution of Claims pursuant to Public Contract Code section 9201, at the County's sole option, the County may submit individual Claims to Arbitration prior to Retention Payment consistent with the requirements of Article 4.6.6.1.

4.6.9.5 *Resolution of Claims in Court of Competent Jurisdiction.* If Claims are not resolved under the procedure set forth and pursuant to Article 4.6.9, such Claim or controversy shall be submitted to a court in the County of the location of the Project after the Project has been completed, and not before.

4.6.9.6 *Warranties, Guarantees and Obligations.* The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon Contractor by the General Conditions and amendments thereto; and all of the rights and remedies available to County and Architect thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by laws or regulations by special warranty or guarantee or by other provisions of the Contract Documents, and the provisions of this Article will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.



# GENERAL CONDITIONS

## **ARTICLE 5 SUBCONTRACTORS**

### **5.1 DEFINITIONS**

#### **5.1.1 Subcontractual Relations Bound to Same Contract Terms at General Contractor**

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

#### **5.1.2 Subcontractor Licenses and DIR Registration**

All Subcontractors shall be properly licensed by the California State Licensing Board. All Subcontractors (of any tier) performing any portion of the Work must comply with the Labor Code sections 1725.5 and 1771.1 and must be properly and currently registered with the California Department of Industrial Relations and qualified to perform public works pursuant to Labor Code section 1725.5 throughout the duration of the Project. No portion of the Work is permitted to be performed by a Subcontractor of any tier unless the subcontractor is properly registered with DIR. Any Subcontractors of any tier not properly registered with DIR shall be substituted in accordance with Labor Code section 1771.1.

#### **5.1.3 Substitution of Subcontractor**

Substitution of Subcontractors shall be permitted only as authorized under Public Contract Code §§ 4107 et seq. Any substitutions of Subcontractors shall not result in any increase in the Contract Price or result in the granting of any extension of time for the completion of the Project.

#### **5.1.4 Contingent Assignment of Subcontracts and Other Contracts**

Each subcontract, purchase order, vendor contract or agreement for any portion of the Work is hereby assigned by the Contractor to the County provided that:

- a. Such assignment is effective only after Termination of this Contract with the Contractor by the County as provided under Article 14 and only for those subcontracts and other contracts and agreements that the County accepts by notifying the Subcontractor or Materialman (as may be applicable) in writing; and

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- b. Such assignment is subject to the prior rights of the Surety(ies) obligated under the Payment Bond and Performance Bond.
- c. The Contractor shall include adequate provisions for this contingent assignment of subcontracts and other contracts and agreements in each such document.

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### ARTICLE 6 CONSTRUCTION BY COUNTY OR BY SEPARATE CONTRACTORS

#### 6.1 COUNTY'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

##### 6.1.1 Separate Contracts.

6.1.1.1 County reserves the right to let other contracts in connection with this Work. Contractor shall afford other contractors reasonable opportunity for (1) introduction and storage of their materials; (2) access to the Work; and (3) execution of their work. Contractor shall properly connect and coordinate its work with that of other Contractors.

6.1.1.2 If any part of Contractor's Work depends on proper execution or results of any other contractor, the Contractor shall inspect and within seven (7) days or less, report to Architect, in writing, any defects in such work that render it unsuitable for proper execution of Contractor's Work. Contractor will be held accountable for damages to County for that Work which it failed to inspect or should have inspected. Contractor's failure to inspect and report shall constitute its acceptance of other contractors' Work as fit and proper for reception of its Work, except as to defects which may develop in other contractors' work after execution of Contractor's work.

6.1.1.3 To ensure proper execution of its subsequent Work, Contractor shall measure and inspect Work already in place and shall at once report to the Architect in writing any discrepancy between executed Work as built and the Contract Documents.

6.1.1.4 Contractor shall ascertain to its own satisfaction the scope of the Project and nature of any other contracts that have been or may be awarded by County in prosecution of the Project and the potential impact of such Work on the Baseline Schedule or Schedule updates.

6.1.1.5 Nothing herein contained shall be interpreted as granting to Contractor the exclusive occupancy at the site of Project. Contractor shall not cause any unnecessary hindrance or delay to any other contractor working on the Project Site. If execution of any contract by the County is likely to cause interference with Contractor's performance of this Contract, once Contractor provides County timely written notice and identifies the Schedule Conflict, County shall decide which contractor shall cease work temporarily and which contractor shall continue, or whether Work can be coordinated so that contractors may proceed simultaneously.

6.1.1.6 County shall not be responsible for any damages suffered or extra costs incurred by Contractor resulting directly or indirectly from award or performance or attempted performance of any other contract or contracts at the Project necessary for the performance of the Project (examples include Electrical Utility Contractor, separate offsite contractor, a separate grading contractor, furniture installation etc.)

**CONTRACTOR IS AWARE THAT THIS CONTRACT MAY BE SPLIT INTO SEVERAL PHASES BASED ON DOCUMENTATION PROVIDED WITH THIS BID OR DISCUSSED AT THE JOB WALK. CONTRACTOR HAS MADE ALLOWANCE FOR ANY DELAYS OR DAMAGES WHICH MAY ARISE FROM COORDINATION WITH CONTRACTORS REQUIRED FOR OTHER PHASES. IF ANY DELAYS SHOULD ARISE FROM ANOTHER CONTRACTOR**

## GENERAL CONDITIONS

**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 THE COUNTY. CONTRACTOR SHALL PROVIDE ACCESS TO OTHER CONTRACTORS FOR OTHER PHASES AS NECESSARY TO PREVENT DELAYS AND DAMAGES TO OTHER CONTRACTORS WORKING ON OTHER PHASES OF CONSTRUCTION.**

### 6.1.2 County's Right to Carry Out the Work

(See Article 2.2)

### 6.1.3 Designation as Contractor

When separate contracts are awarded to contractors on the Project Site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate County/Contractor Agreement.

### 6.1.4 County Notice to the Contractor of Other Contractors

The Contractor shall have overall responsibility to reasonably coordinate and schedule Contractor's activities with the activities of the County's forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the County in reviewing their construction schedules when:

- a. Notice is provided in the Contract Documents of other scope of Work,
- b. In the case where there is known Work to be performed by other Contractors
- c. For outside contractors hired by utilities
- d. Where the Contract Document provides "Work by Others" or "By Others"
- e. Where specifically noted during the Pre-Bid Conference
- f. Where specifically noted in the Mandatory Job Walk
- g. By CO or ICD,
- h. With respect to the installation of :
  1. Furniture,
  2. Electronics and networking equipment,
  3. Cabling,
  4. Low voltage,
  5. Off-site work,
  6. Grading (when by a separate contractor),
  7. Environmental remediation when excluded by the Contract Documents (i.e. asbestos, lead or other hazardous waste removal)
  8. Deep cleaning crews,

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9. Commissioning and testing,
10. Keying and re-keying,
11. Programming

6.1.4.1 Exception where no Coordination is Required on the Part of the Contractor for Turn Key Operations. If the Contractor has specifically outlined a “Turn Key” or “Complete Delivery” of a final completed operational school in writing as part of the Baseline Schedule..

6.1.4.2 The Contractor shall make any revisions to the Baseline Schedule (or Schedule Update) and Contract Sum deemed necessary after a joint review and mutual agreement. The Baseline Schedule (or Schedule Update) shall then constitute the Schedules to be used by the Contractor, separate contractors, and the County until subsequently revised. Additionally, Contractor shall coordinate with Architect, County, and Inspector to ensure timely and proper progress of Work.

### **6.2 CONSTRUCTIVE OWNERSHIP OF PROJECT SITE AND MATERIAL**

Upon commencement of Work, the Contractor becomes the constructive owner of the entire site, improvements, material and equipment on Project site. Contractor must ensure proper safety and storage of all materials and assumes responsibility as if Contractor was the owner of the Project site. All risk of loss or damage shall be borne by Contractor during the Work until the date of Completion. As constructive owner of the Project site, Contractor must carry adequate insurance in case of calamity and is not entitled to rely on the insurance requirements as set forth in this Agreement as being adequate coverage in case of calamity.

### **6.3 COUNTY’S RIGHT TO CLEAN UP**

If a dispute arises among the Contractor, separate contractors, and the County as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish as described in Article 3.12, the County may clean up and allocate the cost among those it deems responsible.

# GENERAL CONDITIONS

## ARTICLE 7 CHANGES IN THE WORK

### 7.1 CHANGES

#### 7.1.1 No Changes Without Authorization

There shall be no change whatsoever in the Drawings, Specifications, or in the Work without an executed Change Order, Change Order Request, Immediate Change Directive, or order by the Architect for a minor change in the Work as herein provided. County shall not be liable for the cost of any extra work or any substitutions, changes, additions, omissions, or deviations from the Drawings and Specifications unless the County's Superintendent or designated representative with delegated authority (subject to Superintendent ratification) has authorized the same and the cost thereof approved in writing by Change Order or executed Construction Change Document. No extension of time for performance of the Work shall be allowed hereunder unless claim for such extension is made at the time changes in the Work are ordered, and such time duly adjusted in writing in the Change Order. The provisions of the Contract Documents shall apply to all such changes, additions, and omissions with the same effect as if originally embodied in the Drawings and Specifications. Notwithstanding anything to the contrary in this Article 7, all Change Orders shall be prepared and issued by the Architect and shall become effective when executed by the County's Superintendent, the Architect, and the Contractor.

Should any Change Order result in an increase in the Contract Price, the cost of such Change Order shall be agreed to, in writing, in advance by Contractor and County and be subject to the monetary limitations set forth in Public Contract Code section 20118.4 (Please check with the County since there are different interpretations of the limitations of Public Contract Code section 20118.4 depending on the County the Project is located). In the event that Contractor proceeds with any change in Work without first notifying County and obtaining the Architect's and County's consent to a Change Order, Contractor waives any Claim of additional compensation for such additional work and Contractor takes the risk that a Notice of Non-Compliance may issue, a critical path Project delay may occur, and the Contractor will also be responsible for the cost of preparation and review fees for a corrective AHJ approved Construction Change Directive.

**CONTRACTOR UNDERSTANDS, ACKNOWLEDGES, AND AGREES THAT THE REASON FOR THIS NOTICE REQUIREMENT IS SO THAT COUNTY MAY HAVE AN OPPORTUNITY TO ANALYZE THE WORK AND DECIDE WHETHER THE COUNTY SHALL PROCEED WITH THE CHANGE ORDER OR ALTER THE PROJECT SO THAT SUCH CHANGE IN WORK BECOMES UNNECESSARY AND TO AVOID THE POSSIBLE DELAYS ASSOCIATED WITH THE ISSUANCE OF A NOTICE OF NON-COMPLIANCE.**

#### 7.1.2 Notices of Non-Compliance

Contractor deviation or changes from approved Plans and Specifications may result in the issuance of a Notice of Non-Compliance. The Contractor is specifically notified that deviations from the Plans and Specifications, whether major or minor, may result in the requirement to obtain a AHJ Construction Change Directive to correct the Notice of Non-Compliance. (See Article 7.3.1 for Definition of CCD). In some cases, the lack of a AHJ approved CCD AND verification from the Inspector that a Notice of Non-Compliance has been corrected may result in a critical path delay to the next stage of Work on the Project. Specifically, a deviation from approved Plans and Specifications may prevent approval of

## **GENERAL CONDITIONS**

the category of Work. Any delays that are caused by the Contractor's deviation from approved Plans and Specifications shall be the Contractor's responsibility.

### 7.1.3 Architect Authority

The Architect will have authority to order minor changes in the Work that do not involve AHJ Approval not involving any adjustment in the Contract Sum, or an extension of the Contract Time.

## **7.2 CHANGE ORDERS ("CO")**

A CO is a written instrument prepared by the Architect and signed by the County (as authorized by the County's Superintendent) the Contractor, and the Architect stating their agreement upon all of the following:

- a. A description of a change in the Work;
- b. The amount of the adjustment in the Contract Sum, if any; and
- c. The extent of the adjustment in the Contract Time, if any.

A CO may be comprised of ICD's, Response to RFP's and COR's

## **7.3 CONSTRUCTION CHANGE DOCUMENT and IMMEDIATE CHANGE DIRECTIVE (ICD)**

### 7.3.1 Definitions

7.3.1.1 *Construction Change Directive (CCD)*. A Construction Change Directive is utilized to address changes to the AHJ approved Plans and Specifications affecting the timing of the project, the cost of the project, or both.

7.3.1.2 *Immediate Change Directive (ICD)*. An Immediate Change Directive is a written order to the Contractor prepared by the Architect and signed by the County (and CM if there is a CM on the Project) and the Architect, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The County may by ICD, without invalidating the Contract, direct immediate changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions within. If applicable, the Contract Sum and Contract Time will be adjusted accordingly.

In the case of an Immediate Change Directive being issued, Contractor must commence Work immediately or delays from failure to perform the ICD shall be the responsibility of Contractor and the failure to move forward with Work immediately shall also be grounds for Termination under Article 14.

An ICD does not automatically trigger an Article 7.6 Dispute or Claim. Contractor must timely follow the procedures outlined at Article 7.6 and 4.6 where applicable.

Refer to Division 1 and Supplementary General Conditions for a copy of the proposed Immediate Change Directive form.

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### 7.3.2 Use to Direct Change

An ICD shall be used to move work forward immediately and to avoid delay. In some cases, an ICD shall be issued in the absence of agreement on the terms of a CO, COR, or RFP. A copy of an ICD form is provided in the Supplementary General Conditions and Division 1. The anticipated not to exceed price for the Work will be inserted into the ICD. In the case of an ICD issued to correct Contractor Deficiencies or to correct a Contractor caused Notice of Non-Compliance, the ICD may be issued with \$0 and no additional time. Contract may prepare a COR associated with the ICD pursuant to Article 7. However, Contractor shall proceed with all Work required under an Approved ICD immediately upon issuance. Failure to proceed with the Work under an ICD shall be grounds for Termination for Cause under Article 14 or take over the Work under Article 2.2.

If adequate time exists, an ICD may be subject of an RFP for pricing and determination if any time that may be required. However, if an RFP is not completed, Contractor shall immediately commence Work when an ICD is issued. If the RFP is incomplete, it may still be completed to be submitted for pricing purposes as long as the RFP is submitted within the timeline provided by the RFP, or within 10 days following issuance of the ICD.

### 7.3.3 ICD Issued Over a Notice of Non-Compliance or to Cover Work

In some cases, an ICD shall be for the purpose of proceeding with Work to keep the Project on Schedule and as an acknowledgement by the County that Contractor is proceeding with Work contrary to a Notice of Non-Compliance, prior to issuance of a AHJ approved CCD, or to direct the covering of Work which has not yet received an Inspection Approval to move forward.

7.3.3.1 *Contractor Compliance with all Aspects of an ICD.* Contractor is to undertake the ICD and comply with all aspects of the Work outlined in the ICD. Inspector is to inspect the Work pursuant to the ICD. Failure to follow the ICD may result in deduction of the ICD Work under Article 2.2 or Termination of the Contractor pursuant to Article 14.

7.3.3.2 *Exception in the Case of an Issued Stop Work Order.* Contractor must proceed with an ICD even if a CCD has not been approved by AHJ except in the case of an AHJ issued Stop Work Order. If a Stop Work Order is issued, Contractor must stop work and wait further direction from the County.

7.3.3.3 *ICD Due to Contractor Deficiency or Contractor Caused Notice of Non-Compliance.* If an ICD is issued to correct a Contractor Deficiency or a Contractor caused notice of Non-Compliance, Contractor specifically acknowledges responsibility for all consequential damages associated with the Contractor Deficiency or Contractor caused Notice of Non-Compliance and all consequential damages and costs incurred to correct the deficiency under Article 4.5

## 7.4 **REQUEST FOR INFORMATION (“RFI”)**

### 7.4.1 Definition

A RFI is a written request prepared by the Contractor requesting the Architect to provide additional information necessary to clarify or amplify an item which the Contractor believes is not clearly shown or called for in the Drawings or Specifications, or to address problems which have arisen under field conditions.



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7.4.1.1 A RFI shall not be used as a vehicle to generate time extensions.

7.4.1.2 Resubmission of the same or similar RFI is not acceptable. RFI's that are similar should be addressed in Project meetings where the requestor (Contractor, Subcontractor or vendor) is able to address the particular issue with the Architect or Engineer and a resolution addressed in the minutes.

7.4.1.3 A RFI response applicable to a specific area cannot be extended to other situations unless specifically addressed in writing within the RFI or in a separate RFI.

7.4.1.4 RFI's should provide a proposed solution and should adequately describe the problem that has arisen.

### 7.4.2 Scope

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

### 7.4.3 Response Time

The Architect must respond to a RFI within a reasonable time after receiving such request. If the Architect's response results in a change in the Work, then such change shall be effected by a written CO, COR RFP or ICD, if appropriate. If the Architect cannot respond to the RFI within a reasonable time, the Architect shall notify the Contractor, with a copy to the Inspector and the County, of the amount of time that will be required to respond.

### 7.4.4 Costs Incurred

The Contractor shall be responsible for any costs incurred for professional services as more fully set forth in Article 4.5, which shall be subject to a Deductive Change Order, if an RFI requests an interpretation or decision of a matter where the information sought is equally available to the party making such request. County, at its sole discretion, shall issue a Deductive Change Order to Contractor for all such professional services arising from this Article.

## **7.5 REQUEST FOR PROPOSAL ("RFP")**

### 7.5.1 Definition

A RFP is a written request prepared by the Architect (and/or CM) requesting the Contractor to submit to the County and the Architect an estimate of the effect of a proposed change on the Contract Price and (if applicable) the Contract Time. If Architect issues a Bulletin, the Changed items in the Bulletin shall be addressed as an RFP and all responses shall be prepared to a Bulletin as addressed in this Article 7.5. A form RFP is included in the Division 1 documents.

### 7.5.2 Scope

A RFP shall contain adequate information, including any necessary Drawings and Specifications, to enable Contractor to provide the cost breakdowns required by Article 7.7. The Contractor

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shall not be entitled to any Additional Compensation for preparing a response to an RFP, whether ultimately accepted or not.

### 7.5.3 Response Time

Contractor shall respond to an RFP within ten (10) days or the time period otherwise set forth in the RFP.

## **7.6 CHANGE ORDER REQUEST (“COR”)**

### 7.6.1 Definition

A COR is a written request prepared by the Contractor supported by backup documentation requesting that the County and the Architect issue a CO based upon a proposed change, cost, time, or cost and time that may be incurred on the Project or arising from an RFP, ICD, or CCD.

### 7.6.2 Changes in Price

A COR shall include breakdowns per Article 7.7 to validate any change in Contract Price due to proposed change or Claim.

### 7.6.3 Changes in Time

A COR shall also include any additional time required to complete the Project only if the delay is a critical path delay. Any additional time requested shall not be the number of days to make the proposed change, but must be based upon the impact to the Project Schedule as defined in Article 8. A schedule fragnet showing the time delay must be submitted with the COR. Any changes in time will be granted only if there is an impact to the critical path. If Contractor fails to request a time extension in a COR, then the Contractor is thereafter precluded from requesting or claiming a delay.

## **7.7 COST OF CHANGE ORDERS**

### 7.7.1 Scope

Within ten (10) days after a request is made for a change that impacts the Contract Sum as defined in Article 9.1, the critical path, or the Contract Time as defined in Article 8.1.1, the Contractor shall provide the County and the Architect, with a written estimate of the effect of the proposed CO upon the Contract Sum and the actual cost of construction, which shall include a complete itemized cost breakdown of all labor and material showing actual quantities, hours, unit prices, and wage rates required for the change, and the effect upon the Contract Time of such CO. Changes may be made by County by an appropriate written CO, or, at the County’s option, such changes shall be implemented immediately upon the Contractor’s receipt of an appropriate written Construction Change Document.

County may, as provided by law and without affecting the validity of this Agreement, order changes, modification, deletions and extra work by issuance of written CO or CCD from time to time during the progress of the Project, Contract Sum being adjusted accordingly. All such Work shall be executed under conditions of the original Agreement except that any extension of time caused thereby shall be adjusted at time of ordering such change. County has discretion to order changes on a “time and material” basis with adjustments to time made after Contractor has justified through documentation the impact on the critical path of the Project.

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7.7.1.1 *Time and Material Charges.* If the County orders Work on a “time and material” basis, timesheets shall be signed daily by the Inspector or County Representative at or near the time the Work is actually undertaken and shall show the hours worked, and the Work actually completed. No time sheets shall be signed the next day. A copy shall be provided to the Person signing the document at the time the document is signed, but not before 10 am the following day.

### 7.7.2 Determination of Cost

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

- a. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation. If an agreement cannot be reached within fifteen (15) days after submission and negotiation of Contractor’s proposal, Contractor may submit pursuant to Article 7.7.3. Submission of sums which have no basis in fact are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq.);
  1. If the County objects to 7.7.2(a) as a method for submission due to inaccuracies in the submitted amount, overstatement of manpower or time required to perform the CO, or unreliability of the data provided, the County may either have the Architect or a professional estimator determine the cost for the CO, and the applicable time extension, or the Contractor shall utilize Article 7.7.2(d) or 7.7.3.
  2. Once the County provides a written objection to use of Article 7.7.2(a) due to unreliability of the estimated price, the Contractor shall no longer utilize mutual acceptance of a lump sum as a method for submission of CO’s and shall provide a breakdown of estimated or actual costs pursuant to Article 7.7.2(d) or 7.7.3
- b. By unit prices contained in Contractor’s original bid and incorporated in the Project documents or fixed by subsequent agreement between County and Contractor;
- c. Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee. However, in the case of disagreement, Contractor must utilize the procedure under Article 7.7.3; or
- d. By cost of material and labor and percentage of overhead and profit. If the value is determined by this method the following requirements shall apply:
  1. *Basis for Establishing Costs*
    - (1) Labor will be the cost for wages prevailing locally for each craft or type of workers at the time the extra Work is done, plus employer payments of payroll taxes and workers compensation insurance (exclude insurance costs as part of the overhead and profit mark-up), health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from

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Federal, State, or local laws, as well as assessments or benefits required by lawful collective bargaining agreements. In no case shall the total labor costs exceed the applicable prevailing wage rate for that particular classification. The use of a labor classification which would increase the extra Work cost will not be permitted unless the Contractor establishes the necessity for such additional costs. Labor costs for equipment operators and helpers shall be reported only when such costs are not included in the invoice for equipment rental.

- (2) Materials shall be at invoice or lowest current price at which such materials are locally available and delivered to the Site in the quantities involved, plus sales tax, freight, and delivery. The County reserves the right to approve materials and sources of supply or to supply materials to the Contractor if necessary for the progress of the Work. No markup shall be applied to any material provided by the County.
- (3) Tool and Equipment Rental. No payment will be made for the use of tools which have a replacement value of \$250 or less.

Regardless of ownership, the rates to be used in determining equipment rental costs shall not exceed listed rates prevailing locally at equipment rental agencies or distributors at the time the Work is performed. Rates applied shall be appropriate based on actual equipment need and usage. Monthly, weekly or other extended use rates that results in the lowest cost shall be applied if equipment is used on site for extended periods.

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

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

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

If tool and equipment charges are part of a Dispute or Claim, the County reserves the right to utilize actual costs for tools and equipment or a depreciation rate for equipment based on audit finding under Article 13.11 and deduct any rental charges that exceed actual or depreciated costs.

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- e. Other Items. The County may authorize other items which may be required on the extra work. Such items include labor, services, material, and equipment which are different in their nature from those required by the Work, and which are of a type not ordinarily available from the Contractor or any of the Subcontractors. Invoices covering all such items in detail shall be submitted with the request for payment.
- f. Invoices. Vendors’ invoices for material, equipment rental, and other expenditures shall be submitted with the COR. If the request for payment is not substantiated by invoices or other documentation, the County may establish the cost of the item involved at the lowest price which was current at the time of the Daily Report.
- g. Overhead. Overhead, including direct and indirect costs, shall be submitted with the COR and include: field overhead, home office overhead, off-site supervision, CO preparation/negotiation/research, time delays, Project interference and disruption, additional guaranty and warranty durations, on-site supervision, additional temporary protection, additional temporary utilities, additional material handling costs, liability and property damage insurance, and additional safety equipment costs.

7.7.3 Format for COR or CO’s

The following format shall be used as applicable by the County and the Contractor to communicate proposed additions to the Contract. All costs submitted shall be actual costs and labor shall be unburdened labor. Refer to Division 1 for a copy of the Construction Change Order form.

	<u>EXTRA</u>	<u>CREDIT</u>
(a) Material (attach itemized quantity and unit cost plus sales tax)	_____	_____
(b) Labor Not to Exceed Applicable Prevailing Wage Rates (attach itemized hours and rates)	_____	_____
(c) Equipment (attach invoices)	_____	_____
(d) Subtotal	_____	_____
(e) If Subcontractor performed work, add Subcontractor’s overhead and profit to portions performed by Subcontractor, not to exceed 10% of item (d).	_____	_____
(f) Subtotal	_____	_____

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		<u>EXTRA</u>	<u>CREDIT</u>
(g)	Contractor’s Overhead and Profit: Not to exceed 10% of Item (d) if Contractor performed the work. No more than 5% of Item (d) if Subcontractor performed the work. If work was performed by Contractor and Subcontractors, portions performed by Contractor shall not exceed 10% of Item (d), and portions performed by Subcontractor shall not exceed 10% of Item (d).		
(h)	Subtotal		
(i)	Bond not to exceed one percent (1%) of Item (h)		
(k)	TOTAL		
(l)	Time/ Days		

The undersigned Contractor approves the foregoing Change Order or Immediate Change Directive as to the changes, if any, and the Contract price specified for each item and as to the extension of time allowed, if any, for completion of the entire Work on account of said Change Order or Immediate Change Directive, and agrees to furnish all labor, materials and service and perform all Work necessary to complete any additional Work specified therein, for the consideration stated herein. It is understood that said Change Order or Immediate Change Directive shall be effective when approved by the Superintendent of the County.

It is expressly understood that the value of such extra Work or changes, as determined by any of the aforementioned methods, expressly includes any and all of the Contractor’s costs and expenses, both direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project. Any costs, expenses, damages or time extensions not included are deemed waived.

The Contractor expressly acknowledges and agrees that any change in the Work performed shall not be deemed to constitute a delay or other basis for claiming additional compensation based on theories including, but not limited to, acceleration, suspension or disruption to the Project.

7.7.3.1 *Adjustment for Time and Compensable Delay.* A CO shall also include any additional time required to complete the Project. Any additional time requested shall not be the number of days to make the proposed change, but must be based upon the impact to the Project Schedule as defined in Article 8 of the General Contract. A schedule fragnet showing the time delay must be submitted with the CO. Any changes in time will be granted only if there is an impact to the critical path. If Contractor fails to request a time extension in a CO, then the Contractor is thereafter precluded from requesting or claiming a delay.

7.7.4 Deductive Change Orders

## GENERAL CONDITIONS

All Deductive Change Order(s) must be prepared utilizing the form under Article 7.7.3 (a) – (d) only, setting forth the actual costs incurred. Except in the case of an Article 2.2 or 9.6 Deductive Change Order where no mark-up shall be allowed, Contractor will be allowed a maximum of 5% total profit and overhead.

For unilateral Deductive Change Orders, or where credits are due from Contractor for Allowances, Deductive Items, Inspection, Damage, CCD review costs, Architect or Inspector costs for after hours or corrective services, Work removed from the Agreement under Article 2.2 or Article 9.6, there shall be no mark-up.

County may, any time after a Deductive Change Order is presented to Contractor by County for items under Article 2.2 or Article 9.6 or if there is disagreement as to the Deductive Change Order, issue a unilateral Deductive Change Order on the Project and deduct the Deductive Change Order from a Progress Payment, Final Payment, or Retention.

### 7.7.5 Discounts, Rebates, and Refunds

For purposes of determining the cost, if any, of any change, addition, or omission to the Work hereunder, all trade discounts, rebates, refunds, and all returns from the sale of surplus materials and equipment shall accrue and be credited to the Contractor, and the Contractor shall make provisions so that such discounts, rebates, refunds, and returns may be secured, and the amount thereof shall be allowed as a reduction of the Contractor's cost in determining the actual cost of construction for purposes of any change, addition, or omissions in the Work as provided herein. All CO's are subject to Audit under Article 13.11 for discounts, rebates and refunds.

### 7.7.6 Accounting Records

With respect to portions of the Work performed by CO's and CCD's on a time-and-materials, unit-cost, or similar basis, the Contractor shall keep and maintain cost-accounting records in a format consistent with accepted accounting standards and satisfactory to the County, which shall be available to the County on the same terms as any other books and records the Contractor is required to maintain under the Contract Documents.

Any time and material charges shall require Inspector's signature on time and material cards showing the hours worked and the Work actually completed. (See Article 7.7.1.1)

### 7.7.7 Notice Required

If the Contractor desires to initiate a Dispute or Claim for an increase in the Contract Price, or any extension in the Contract Time for completion, Contractor shall notify the applicable party responsible for addressing the Dispute or Claim pursuant to Article 4.6. No Claim or Dispute shall be considered unless made in accordance with this subparagraph. Contractor shall proceed to execute the Work even though the adjustment may not have been agreed upon. Any change in the Contract Price or extension of the Contract Time resulting from such Claim shall be authorized by a CO.

### 7.7.8 Applicability to Subcontractors

Any requirements under this Article 7 shall be equally applicable to CO's, COR's or ICD's issued to Subcontractors by the Contractor to the same extent required by the Contractor.

## **GENERAL CONDITIONS**

### 7.7.9 Alteration to Change Order Language

Contractor shall not alter or reserve time in COR's, CO's or ICD's. Contractor shall execute finalized CO's and proceed under Article 7.7.7 and Article 4.6 with proper notice. If Contractor intends to reserve time without an approved CPM schedule prepared pursuant to Article 8 or without submitting a fragnet showing delay to critical path, then Contractor may be prosecuted pursuant to the False Claim Act.



# **GENERAL CONDITIONS**

## **ARTICLE 8 TIME AND SCHEDULE**

### **8.1 DEFINITIONS**

#### **8.1.1 Contract Time**

Contractor shall perform and reach Substantial Completion (See Article 1.1.46) within the time specified in the Agreement Form. Moreover, Contractor shall perform its Work in strict accordance with the Project Milestones in the Contract Documents and shall proceed on a properly developed and approved Baseline Schedule, which represents the Contractor's view of the practical way in which the Work will be accomplished. Note that Contract Time includes and incorporates all Float and other Baseline inclusions as noted in Article 8.3.2.1 and as otherwise specifically noted in Article 8.

#### **8.1.2 Notice to Proceed**

County may give a Notice to Proceed within ninety (90) days of the award of the bid by County. Once Contractor has received the notice to proceed, Contractor shall complete the Work in the period of time referenced in the Contract Documents.

In the event that County desires to postpone the giving of the Notice to Proceed beyond this three-month period, it is expressly understood that with reasonable notice to the Contractor, the giving of the date to proceed may be postponed by County. It is further expressly understood by Contractor, that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the giving of the notice to proceed

If the Contractor believes that a postponement will cause a hardship to Contractor, Contractor may terminate the Contract with written notice to County within 10 days after receipt by Contractor of County's notice of postponement. It is further understood by Contractor that in the event that Contractor terminates the Contract as a result of postponement by the County, the County shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement and the grounds for notification and hardship shall be subject to Audit pursuant to Article 13.11. Should Contractor terminate the Contract as a result of a notice of postponement, County may award the Contract to the next lowest responsible bidder.

#### **8.1.3 Computation of Time**

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

#### **8.1.4 Float**

Float is time the total number of days an activity may be extended or delayed without delaying the Completion Date shown in the schedule. Float will fall into three categories: (1) Rain Days; (2) Governmental Delays; and, (3) Project Float. Project Float and Rain Days are owned by the Project and may be utilized as necessary for critical path delays once the days become available for consumption (i.e. the Rain Day arrives and is not utilized since rain did not occur or Work was performed on the interior of a building). However, Governmental Delay float shall not be utilized for purposes other than to address critical path delays that arise due to approvals, Inspector approvals or verifications on governmental forms.

## **GENERAL CONDITIONS**

8.1.4.1 *Governmental Delay Float.* It is anticipated that there will be governmental generated delays. Specific to AHJ approvals, it is anticipated that no less than twelve (12) days per calendar year shall be set aside as Governmental Float to be utilized on critical path delays. A pro-rated number of days shall be calculated based on length of Contract Time. (For example, a two (2) year Contract Time shall require twenty-four (24) days of Governmental Float. If the Contract Time is 182 days, then the Contract Time shall require six (6) days of Governmental Float) This Governmental Delay float must be incorporated into the schedule and should be incorporated in each critical activity as Contractor deems fit. Specifically, major categories of Work (Project Inspection Form) should be allocated Governmental Delay Float at the Contractor's discretion. Governmental Delay Float on the Project may exceed 12 days per one (1) year period, but Contractor is required to include not be less than 12 days of Governmental Delay Float during each one (1) year period.

Contractor's failure to establish a protocol for requesting inspections is not grounds to utilize Governmental Delay Float. As noted in Article 3.1.4, 48 hours advance notice of commencing Work on a new area is required. Failure to plan, and pay (if applicable) for quicker delivery of Special Inspections is not Governmental Delay Float under Article 8.1.4.1. If Governmental Delay Float is not utilized, this float is carried through to other categories of inspection and consumed over the course of the Project

Governmental Delay Float may be utilized for a Stop Work Order regardless of fault as defined under Education Code section 17307.5(b).

8.1.4.2 *Inclement Weather (Rain Days).* The Contractor will only be allowed a time extension for unusually severe weather if it results in precipitation or other conditions which in the amount, frequency, or duration is in excess of the norm at the location and time of year in question as established by NOAA weather data. No less than 22 calendar days for each calendar year for Southern California will be allotted for in the Contractor's schedule for each winter weather period or carried at the end of the schedule as Rain Float. Float for weather days in other geographical regions shall be adjusted based on NOAA weather data for the geographical location. Contractor has anticipated all the days it takes to dry out and re-prepare areas that may be affected by weather delays which extend beyond the actual weather days. The weather days shall be shown on the schedule and if not used will become float for the Project's use. The Contractor will not be allowed a day-for-day weather delay for periods noted as float in the Schedule. The Contractor is expected to work seven (7) days per week (if necessary, irrespective of inclement weather), to maintain access, and to protect the Work under construction from the effects of inclement weather. Additional days beyond the NOAA shall be considered under the same criteria that weather days are granted below.

A Rain Day shall be granted by Architect or CM if the weather prevents the Contractor from beginning Work at the usual daily starting time, or prevents the Contractor from proceeding with seventy-five (75%) of the normal labor and equipment force towards completion of the day's current controlling item on the accepted schedule for a period of at least five hours, and the crew is dismissed as a result thereof, the Architect will designate such time as unavoidable delay and grant one (1) critical path activity calendar-day extension if there is no available float for the calendar year.

8.1.4.3 *Project Float.* The Contractor may determine some activities require a lesser duration than allocated and may set aside float in the Project Schedule. There shall be no early completion. Instead, to the extent float is either addressed at the end of the Project or throughout each category of critical path work, Project float may be used as necessary during the course of the Project and allocated on a first, come first serve basis. However, the use of float does not extend to Governmental Delay Float, which shall only be used for Governmental Delays.

## **GENERAL CONDITIONS**

### **8.2 HOURS OF WORK**

#### 8.2.1 Sufficient Forces

Contractors and Subcontractors shall continuously furnish sufficient forces to ensure the prosecution of the Work in accordance with the Construction Schedule.

#### 8.2.2 Performance During Working Hours

Work shall be performed during regular working hours as permitted by the appropriate governmental agency except that in the event of an emergency, or when required to complete the Work in accordance with job progress, Work may be performed outside of regular working hours with the advance written consent of the County and approval of any required governmental agencies.

#### 8.2.3 Costs for After Hours Inspections

If the Work done after hours is required by the Contract Documents, a Recovery Schedule, or as a result of the Contractor's failure to plan, and inspection must be conducted outside the Inspector's regular working hours, the costs of any after hour inspections, shall be borne by the Contractor.

If the County allows the Contractor to do Work outside regular working hours for the Contractor's convenience, the costs of any inspections required outside regular working hours shall be invoiced to the Contractor by the County and a Deductive Change Order shall be issued from the next Progress Payment.

If the Contractor elects to perform Work outside the Inspector's regular working hours, costs of any inspections required outside regular working hours shall be invoiced to the Contractor by the County and a Deductive Change Order from the next Progress Payment as a Deductive Change Order.

### **8.3 PROGRESS AND COMPLETION**

#### 8.3.1 Time of the Essence

Time limits stated in the Contract Documents are of the essence to the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

#### 8.3.2 Baseline Schedule Requirements

8.3.2.1 *Timing:* Within ten (10) calendar days after Notice to Proceed, Contractor shall submit a practical schedule showing the order in which the Contractor proposes to perform the Work, and the dates on which the Contractor contemplates starting and completing the salient categories of the Work. This first schedule which outlines the Contractor's view of the practical way in which the Work will be accomplished is the Baseline Schedule. If the Contractor Fails to submit the Baseline Schedule within the ten (10) days noted, then County may withhold processing and approval of progress payments pursuant to Article 9.4 and 9.6.

8.3.2.2 *County Review and Approval:* County, Architect and CM will review both a paper and electronic copy of Baseline Schedule and may provide comments as noted in this Article and either approve or disapprove the Baseline Schedule. All Schedules shall be prepared using an electronic

## **GENERAL CONDITIONS**

scheduling program acceptable to County. All Schedules shall be delivered in an electronic format usable by the County. All logic ties and electronic information shall be included in the electronic copy of the Baseline Schedule that is delivered to the County.

8.3.2.3 *Schedule Must Be Within the Given Contract Time.* The Baseline Schedule shall not exceed time limits set forth in the Contract Documents and shall comply with all of the scheduling requirements as set forth in the Specifications and Contract Documents.

8.3.2.4 *Submittals Must Be Incorporated (See Articles 3.7 and 3.9):* Contractor shall include Submittals as line items in the Baseline Schedule as required under Article 3.7.2 and 3.9.6. Submittals shall not delay the Work, Milestones, or the Completion Date. Failure to include Submittals in the Baseline Schedule shall be deemed a material breach by the Contractor.

8.3.2.5 *Float Must Be Incorporated.* The Baseline Schedule must indicate the beginning and completion of all phases of construction and shall use the “critical path method” (commonly called CPM) for the value reporting, planning and scheduling, of all Work required under the Contract Documents. The Baseline Schedule must incorporate all Milestones in the Project and apply Governmental Float at each Milestone in the Contractor’s discretion. The Baseline Schedule shall incorporate any Schedule provided by the County as part of the bid and shall note durations that will not be adequate or should be shortened based on Contractor’s review. These changes shall be identified and incorporated into Contractor’s Baseline Schedule as long as requested changes are made within 10 days after the County chooses to move forward with the Project. Scheduling is necessary for the County’s adequate monitoring of the progress of the Work and shall be prepared in accordance with the time frame described in this Article 8. The Architect may disapprove of any Schedule or require modification to it if, in the opinion of the Architect or County, adherence to the any Schedule prepared by the Contractor will not cause the Work to be completed in accordance with the Agreement.

8.3.2.6 *No Early Completion.* Contractor shall not submit any Schedule showing early completion without indicating float time through the date set for Project completion by County. Contractor’s Baseline Schedule shall account for all days past early completion as float which belongs to the Project. Usage of float shall not entitle Contractor to any delay Claim or damages due to delay.

8.3.2.7 *Use of Schedule Provided in Bid Documents.* In some cases, the bid will include a preliminary schedule indicating Milestones and construction sequences for the Project along with general timing for the Project. The preliminary schedule is not intended to serve as the Baseline Schedule utilized for construction. It is up to the Contractor to study and develop a Baseline Schedule to address the actual durations and sequences of Work that is anticipated while maintaining the Milestones provided by the County. Contract shall obtain information from Contractor’s Subcontractors and vendors on the planning, progress, delivery of equipment, coordination, and timing of availability of Subcontractors so a practical plan of Work is fully developed and represented in the Baseline Schedule.

8.3.2.8 *Incorrect Logic, Durations, Sequences, or Critical Path.* The County may reject or indicate durations, sequences, critical path or logic are not acceptable and request changes. The electronic copy of the Baseline Schedule shall have adequate information so logic ties, duration, sequences and critical path may be reviewed electronically. Contractor is to diligently rebuild and resubmit the Baseline Schedule to represent the Contractor’s plan to complete the Work and maintain Milestones at the next progress meeting, or before the next progress meeting. If Contractor is not able to build a Baseline Schedule that is acceptable to the County or Architect, the County reserves the right to utilize the unapproved originally submitted Baseline Schedule (See Article 8.3.2.12) and the comments submitted to hold Contractor accountable for timely delivery of Work and maintenance of Milestones. Furthermore,

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Contractor's representations in the Baseline Schedule, if unacceptable, may also be used as a basis for termination of the Contract under Article 14 if Contractor fails to adequately maintain the Schedule and falls significantly behind without undertaking the efforts to either submit and follow a Recovery Schedule or fail to submit a Recovery Schedule and make no effort toward recovery on the Project.

8.3.2.9 *Contractor Responsibility Even if Schedule Issues Are Not Discovered.* Failure on the Part of the County to discover errors or omissions in any Schedules submitted shall not be construed to be an approval of the error or omission and any flawed Schedule is not grounds for a time extension.

8.3.2.9 Inclusions in Baseline Schedule. In addition to scheduling requirements set forth at Article 8.3.2, Contractor is specifically directed to include (broken out separately) in Contractor's Baseline Schedule and all Schedule updates, the following items required pursuant to these General Conditions, including but not limited to:

1. Rain Day Float (excluding inclement weather) as required under Article 8.1.4.2. For example, if the NOAA provides 22 days of Rain Days, all 22 days must be incorporated and noted in the Baseline Schedule. Further, any days required to clean-up or dry out shall be included for operations that are likely to require a clean-up or dry out period. Days that are not utilized shall be considered float owned by the Project.
2. Governmental Delay Float under Article 8.1.4.1. This Governmental Delay Float shall only be utilized for Governmental Delays and shall not be considered available float owned by the Project. This float shall only be distributed to the Project upon the completion of the Project and shall be used to offset Liquidated Damages and shall not generate compensable delays.
3. Submittal and Shop Drawing schedule under Article 3.9.
4. Deferred Approvals under Article 3.9.
5. Time for separate contractors, including furniture installation and start up activities, under Article 6.1.
6. Coordination and timing of any Drawings, approvals, notifications, permitting, connection, and testing for all utilities for the Project. (See Article 2.1.4).
7. Testing, special events, or school activities

8.3.2.10 *Failure to include Mandatory Schedule Items.* County may withhold payment pursuant to Articles 9.3, 9.4 and 9.6. In lieu of withholding payment for failure to include Mandatory Schedule Items, after the County or Architect has notified the Contractor of failure to meet the Baseline Schedule or Updated Schedule requirements and provided a written notification of this failure and provided a written notice of Schedule preparation errors, and the Contractor fails to correct the noted deficiencies or the Contractor does not provide an updated Baseline Schedule correcting the deficiencies, then Contractor shall not be granted an extension of time for failure to obtain necessary items and approvals under Article 8.3.2 and for the time required for failure to comply with laws, building codes, and other regulations

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(including Title 24 of the California Code of Regulations). Contractor shall maintain all required Article 8.3.2 Schedule items in the Baseline Schedule and indicate any days that have been used as allowed in Article 8. If Contractor fails to include all Article 8.3.2 items in its Baseline Schedule or Schedule Updates and the County either utilizes an Unapproved Schedule under Article 8.3.2.12 or does not object to the inclusion of required scheduling items, then all mandatory Schedule inclusions, including float, shall be utilized in the County's discretion. If the Contract Time is exceeded, then Contractor shall be subject to the assessment of Liquidated Damages pursuant to Article 8.4.

8.3.2.11 *Failure to Meet Requirements.* Failure of the Contractor to provide proper Schedules as required by this Article and Article 9 is a material breach of the Contract and grounds for Termination pursuant to Article 14. The County, at its sole discretion, may choose, instead, to withhold, in whole or in part, any Progress Payments or Retention amounts otherwise payable to the Contractor.

8.3.2.12 *Use of an Unapproved Baseline Schedule.* If the Baseline Schedule submitted by the Contractor is unacceptable to the County (i.e. failing to meet the requirements of Article 8.3.2) and Contractor does not incorporate or address the written comments to the Baseline Schedule and a Baseline Schedule is not approved, but due to extreme necessity, the County moves forward without an approved Baseline Schedule, Contractor shall diligently revise and meet Schedule update requirements of Article 8 and incorporate all Article 8.3.2 comments in all updates). However, for purposes of Termination pursuant to Article 14, the unapproved Baseline Schedule initially submitted shall be treated as the Baseline Schedule with durations shortened or revised to accommodate all float, all mandatory Schedule requirements under Article 8.3.2, any requirements in the Contract Documents, and all revisions by the County or Architect.

### 8.3.3 Update Schedules

8.3.3.1 *Updates Shall Be Based on Approved Baseline Schedule.* Except in the case where there has not been agreement as to a Baseline Schedule, the approved Baseline Schedule shall be used to build future Schedule updates. Schedule updates shall be a CPM based Schedule consistent with the Baseline Schedule requirements of 8.3.2

In the case that no Baseline has been approved, Schedule updates shall be provided monthly and each update shall incorporate all comments and revisions noted as not complying with the requirements of Article 8.3.2. Contractor shall be held to the Article 8.3.2.12 unapproved Baseline Schedule, inclusive of all Milestones, float, comments and revisions by the County and Architect, all required Baseline Schedule Inclusions under Article 8.3.2, and any requirements in the Contract Documents.

8.3.3.2 *Schedule Updates.* Contractor shall update the approved Schedule each month to address actual start dates and durations, the percent complete on activities, actual completion dates, estimated remaining duration for the Work in progress, estimated start dates for Work scheduled to start at future times and changes in duration of Work items

8.3.3.3 *Listing of Items Causing Delays.* Schedule updates shall provide a listing of activities which are causing delay in the progress of Work and a narrative shall be provided showing a description of problem areas, anticipated delays, and impacts on the Construction Schedule. Simply stating "County Delay" or "Architect Delay" shall be an inadequate listing. Delays shall only be listed if they meet the requirements of Article 8.4.

8.3.3.4 *Recovery Schedule.* In addition to providing a schedule update every thirty (30) days, the Contractor, if requested by the Architect or County, shall take the steps necessary to improve

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Contractor's progress and demonstrate to the County and Architect that the Contractor has seriously considered how the lost time, the Completion Date, or the Milestones that are required to be met within the terms of the Contract. Contractor shall immediately provide a Recovery Schedule showing how Milestones and the Completion Date will be met. In no case, shall a Recovery Schedule be provided later than ten (10) days following the request for a Recovery Schedule from the Architect or County.

- a. Failure to Provide a Recovery Schedule. Shall subject Contractor to the assessment of Liquidated Damages for failure to meet the Contract Time. Refusal or failure to provide a Recovery Schedule shall be considered a substantial failure of performance and a material breach of Contract and may result in Termination of the Contract pursuant to Article 14.
- b. Recovery Schedule Acceleration without Additional Cost. The County may require Contractor prepare a Recovery Schedule showing how the Project shall be accelerated, without any additional cost to the County. The County may order, without additional cost, the following:
  1. Increase the number of shifts;
  2. Utilize overtime to recover the approved Schedule; and/or
  3. Increase the days when Work occurs, including weekends, at the Project and at any manufacturer's plant.
- c. Recovery Schedule Acceleration without Additional Cost. If Contractor disputes that the Recovery Schedule acceleration shall be issued without additional costs, the Contractor shall submit concurrent with Recovery Schedule acceleration notice pursuant to Articles 8.4.3 and 8.4.4.

### **8.4 EXTENSIONS OF TIME - LIQUIDATED DAMAGES**

#### **8.4.1 Liquidated Damages**

CONTRACTOR AND COUNTY HEREBY AGREE THAT THE EXACT AMOUNT OF DAMAGES FOR FAILURE TO COMPLETE THE WORK WITHIN THE TIME SPECIFIED IS EXTREMELY DIFFICULT OR IMPOSSIBLE TO DETERMINE. IF THE WORK IS NOT SUBSTANTIALLY COMPLETED IN THE TIME SET FORTH IN THE AGREEMENT, IT IS UNDERSTOOD THAT THE COUNTY WILL SUFFER DAMAGES. IT BEING IMPRACTICAL AND UNFEASIBLE TO DETERMINE THE AMOUNT OF ACTUAL DAMAGE, IT IS AGREED THE CONTRACTOR SHALL PAY TO THE COUNTY THE AMOUNT LIQUIDATED DAMAGES SET FORTH IN THE AGREEMENT, FOR EACH CALENDAR DAY OF DELAY IN REACHING SUBSTANTIAL COMPLETION (SEE ARTICLE 1.1.46). CONTRACTOR AND ITS SURETY SHALL BE LIABLE FOR THE AMOUNT THEREOF PURSUANT TO GOVERNMENT CODE SECTION 53069.85.

#### **8.4.2 Delay**

Except and only to the extent provided under Article 7 and Article 8, by signing the Agreement, Contractor agrees to bear the risk of delays to Completion of the Work and that Contractor's bid for the Project was made with full knowledge of this risk.

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In agreeing to bear the risk of delays to complete the Work, Contractor understands that, except and only to the extent provided otherwise in Article 7 and 8, the occurrence of events that delay the Work shall not excuse Contractor from its obligation to achieve Completion of the Project within the Contract Time, and shall not entitle the Contractor to an adjustment to the Contract time.

### 8.4.3 Excusable Delay

Contractor shall not be charged for Liquidated Damages because of any delays in completion of Work which are not the fault or negligence of Contractor or its Subcontractors, arising from Rain Float or Project Float, including acts of God, as defined in Public Contract Code section 7105, acts of enemy, epidemics and quarantine restrictions. Contractor shall within five (5) calendar days of beginning of any such delay notify County in writing of causes of delay; thereupon County shall ascertain the facts and extent of delay and grant extension of time for completing Work when, in its judgment, the findings of fact justify such an extension. Extensions of time shall apply only to that portion of Work affected by delay, and shall not apply to other portions of Work not so affected. An extension of time may only be granted after proper compliance with Article 8.3 requiring preparation and submission of a properly prepared CPM schedule.

8.4.3.1 *Excusable Delay Is Not Compensable.* No extended overhead, general conditions costs, impact costs, out-of-sequence costs or any other type of compensation, by any name or characterization, shall be paid to the Contractor for any delay to any activity not designated as a critical path item on the latest approved Project schedule.

8.4.3.2 *Notification.* The Contractor shall notify the Architect in writing of any anticipated delay and its cause, in order that the Architect may take immediate steps to prevent, if possible, the occurrence or continuance of delay, and may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work might be delayed thereby.

8.4.3.3 *Extension Request.* In the event the Contractor requests an extension of Contract time for unavoidable delay, such request shall be submitted in accordance with the provisions in the Contract Documents governing changes in Work (See Article 7). When requesting time, i.e., extensions, for proposed Change Orders, they must be submitted with the proposed Change Order with full justification and documentation. If the Contractor fails to submit justification with the proposed Change Order it waives its right to a time extension at a later date. Such justification must be based on the official Contract schedule as updated at the time of occurrence of the delay or execution of Work related to any changes to the scope of Work. Blanket or general claims for extra days without specific detailed information as required herein or a blanket or general reservation of rights do not fulfill the requirements of this Article and shall be denied. The justification must include, but is not limited to, the following information:

- a. The duration of the activity relating to the changes in the Work and the resources (manpower, equipment, material, etc.) required to perform these activities within the stated duration.
- b. Logical ties to the official Baseline Schedule or Approved Updated Schedule for the proposed changes and/or delay showing the activity/activities in the schedule whose start or completion dates are affected by the change and/or delay. (A fragnet of any delay of over ten (10) days must be provided.)



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The Contractor and County understand and expressly agree that insofar as Public Contract Code section 7102 may apply to changes in the Work or delays under this Contract, the actual delays and damages, if any, and time extensions are intended to, and shall provide, the exclusive and full method of compensation for changes in the Work and construction delays.

### 8.4.4 Notice by Contractor Required

The Contractor shall within five (5) calendar days of beginning of any such delay notify the County in writing of causes of delay with justification and supporting documentation. In the case of a Recovery Schedule pursuant to Article 8.3.3.4, Contractor shall submit written notice concurrent with the Recovery Schedule. County will then ascertain the facts and extent of the delay and grant an extension of time for completing the Work when, in its judgment, the findings of fact justify such an extension. Extensions of time shall apply only to that portion of the Work affected by the delay and shall not apply to other portions of the Work not so affected.

Claims relating to time extensions shall be made in accordance with applicable provisions of Article 7.

8.4.4.1 *Adjustment for Compensable Delays.* The Schedule may be adjusted for a delay if, and only if, Contractor undertakes the following:

- a. Contractor submits a timely COR or CO pursuant to the requirements of Article 7.
- b. Contractor submits a fragnet showing the critical path delay caused by the COR, CO, Changed Condition, CCD, or ICD
- c. Contractor has addressed all required float days in the Fragnet.
- d. Contractor submits a complete breakdown of all costs incurred utilizing the format of Article 7.3.3

### 8.4.5 No Additional Compensation for Coordinating Governmental Submittals and the Resulting Work

CONTRACTOR HAS PLANNED ITS WORK AHEAD OF TIME AND IS AWARE THAT GOVERNMENTAL AGENCIES, SUCH AS THE GAS COMPANIES, ELECTRICAL UTILITY COMPANIES, WATER DISTRICTS AND OTHER AGENCIES MAY HAVE TO APPROVE CONTRACTOR PREPARED DRAWINGS OR APPROVE A PROPOSED INSTALLATION. CONTRACTOR HAS INCLUDED DELAYS AND DAMAGES WHICH MAY BE CAUSED BY SUCH AGENCIES IN CONTRACTOR'S BID AND HAS INCLUDED ADEQUATE TIME IN THE CONTRACTOR'S BASELINE SCHEDULE. FAILURE TO ADEQUATELY PLAN AND SCHEDULE IS NOT A BASIS TO USE GOVERNMENTAL DELAY FLOAT.

### 8.4.6 County Right to Accelerate the Work

The County may direct the Contractor to meet schedule requirements when the Work has been delayed. The County shall compensate the Contractor for the additional costs incurred by acceleration to the extent that such costs are directly attributable to the acceleration and are incurred through no fault or negligence of the Contractor.

## **GENERAL CONDITIONS**

8.4.6.1 *Management of Acceleration.* Contractor acceleration shall not include Work that is part of the scope of Work detailed in the Plans and Specifications. Instead, the acceleration costs shall be premium or overtime and quantifiable additional work added to the Project meant to accelerate the Project. Contractor is directed to keep consistent crews on the Project so time can be tracked. If crews are circulated off the Project or crews brought in only for overtime, the County may be charged for Contract Work and not accelerated time. In such case, the County may object to the costs submitted.

8.4.6.2 *Costs for Acceleration.* Cost for Acceleration shall be supported by backup documentation, and time sheets signed by the Inspector for each day work has been performed, at or near the time when the Work was performed. A listing on the time sheet shall document all labor, materials and services utilized that day and provide areas of work, and amount of work performed. Contractor shall comply with submission requirements of Article 7.7.

# **GENERAL CONDITIONS**

## **ARTICLE 9 PAYMENTS AND COMPLETION**

### **9.1 CONTRACT SUM**

The Contract Sum or Contract Price is stated in the Agreement and, including authorized adjustments, is the total amount payable by the County to the Contractor for performance of the Work under the Contract Documents.

### **9.2 COST BREAKDOWN**

#### **9.2.1 Required Information**

Contractor shall furnish the following:

- a. Within ten (10) days after Notice to Proceed, a detailed breakdown of the Contract Price (hereinafter "Schedule of Values") for each Project, Site, building, Milestone or other meaningful method to measure the level of Project Completion as determined by the County shall be submitted as a Submittal for the Project.;
- b. Within ten (10) days after the date of the Notice to Proceed, a schedule of estimated monthly payment requests due the Contractor showing the values and construction time of the various portions of the Work to be performed by it and by its Subcontractors or material and equipment suppliers containing such supporting evidence as to its correctness as the County may require;
- c. Within ten (10) days after the date of the Notice to Proceed, address, telephone number, telecopier number, California State Contractors License number, classification and monetary value of all subcontracts for parties furnishing labor, material, or equipment for completion of the Project.

#### **9.2.2 Information and Preparation of Schedule of Values**

9.2.2.1 *Break Down of Schedule of Values.* Schedule of Values shall be broken down by Project, site, building, Milestone, or other meaningful method to measure the level of Project Completion as determined by the County.

9.2.2.2 *Based on Contractor Bid Costs.* The Schedule of Values shall be based on the costs from Contractor's bid to the County. However, the submission of the Schedule of Values shall not be front loaded so the Contractor is paid a greater value than the value of the Work actually performed and shall not shift funds from parts of the Project that are later to Work that is performed earlier.

9.2.2.3 Largest Dollar Value for Each Line Item. Identify Subcontractors and materials suppliers proposed to provide portions of Work equal to or greater than ten thousand dollars (\$10,000) or one-half of one percent (0.5%) of their Contract Price, whichever is less.

9.2.2.4 *Allowances.* Any Allowances provided for in the Contract shall be a line item in the Schedule of Values.

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9.2.2.5 *Labor and Materials Shall Be Separate.* Labor and Materials shall be broken into two separate line items unless specifically agreed in writing by the County.

### 9.2.3 County Approval Required

The County shall review all submissions received pursuant to Article 9.2 in a timely manner. All submissions must be approved by the County before becoming the basis of any payment.

## **9.3 PROGRESS PAYMENTS**

### 9.3.1 Payments to Contractor

Within thirty-five (35) days after approval of the Request for Payment, Contractor shall be paid a sum equal to ninety-five percent (95%) of the value of the Work performed (as certified by Architect and Inspector and verified by Contractor) up to the last day of the previous month, less the aggregate of previous payments. The value of the Work completed shall be the Contractor's best estimate. Work completed as estimated shall be an approximation or estimate only and no mistake, inaccuracy, error or falsification in said any approved estimate shall operate to release the Contractor, or any Surety upon any bond, from damages arising from such Work, or from the County's enforcement of each and every provision of this Contract including but not limited to the Performance Bond and Payment Bond. The County shall have the right to subsequently to correct any mistake, inaccuracy, error or falsification made or otherwise set forth in any approved Request for Payment and such correction may occur in any future Payment Application or in the Retention Payment to the Contractor. No Surety upon any bond shall be relieved, released or exonerated of its obligations under this Contract or any applicable bond when the County is unable to correct an overpayment to the Contractor due to any abandonment by the Contractor or termination by the County.

The Contractor shall not be entitled to have any payment requests processed, or be entitled to have any payment made for Work performed, so long as any lawful or proper direction given by the County concerning the Work, or any portion thereof, remains incomplete.

Notwithstanding anything to the contrary stated above, the Contractor may include in its Request for Payment the value of any structural steel, glue laminated beams, trusses, bleachers and other such custom-made materials prepared specifically for the Project and unique to the Project so long as all of the following requirements are satisfied:

- a. The aggregate cost of materials stored off-site shall not exceed Twenty Five Thousand Dollars (\$25,000) at any time or as otherwise agreed to be County in writing;
- b. Title to such materials shall be vested in the County as evidenced by documentation satisfactory in form and substance to the County, including, without limitation, recorded financing statements, UCC filings and UCC searches;
- c. With each Contractor Request for Payment, the Contractor shall submit to the County a written list identifying each location where materials are stored off-site (which must be a bonded warehouse) and the value of the materials at each location. The Contractor shall procure insurance satisfactory to the County (in its reasonable discretion) for materials stored off-site in an amount not less than the total value thereof;

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- d. The consent of any Surety shall be obtained to the extent required prior to payment for any materials stored off-site;
- e. Representatives of the County shall have the right to make inspections of the storage areas at any time; and
- f. Such materials shall be: (1) protected from diversion, destruction, theft and damage to the reasonable satisfaction of the County; (2) specifically marked for use on the Project; and (3) segregated from other materials at the storage facility.

### 9.3.2 Purchase of Materials and Equipment and Cost Fluctuations

The Contractor is required to order, obtain, and store materials and equipment sufficiently in advance of its Work at no additional cost or advance payment from County to assure that there will be no delays. Contractor understands that materials fluctuate in value and shall have adequately addressed market fluctuations through agreements with Contractor vendors or by other means. Contractor further understands and incorporates into Contractor's bid cost any wage rate increases during the Project for the Contractor's labor force as well as all other Subcontractor and vendor labor forces. County shall not be responsible for market fluctuations in costs or labor rate increases during the Project. Contractor further has incorporated any and all cost increases in areas of Work where there may be schedule variations so that cost increases are not passed through to the County.

### 9.3.3 No Waiver

No payment by County hereunder shall be interpreted so as to imply that County has inspected, approved, or accepted any part of the Work. Contractor specifically understands:

“It is the duty of the contractor to complete the work covered by his or her contract in accordance with the approved Plans and Specifications therefore. The contractor in no way is relieved of any responsibility by the activities of the Architect, Engineer, Inspector or AHJ in the performance of such duties... In no case, however, shall the instruction of the Architect or registered Engineer be construed to cause work to be done with is not in conformity with the approved Plans, Specifications, and change orders...”

Notwithstanding any payment, the County may enforce each and every provision of this Contract which includes, but is not limited to, the Performance Bond and Payment Bond. The County may correct any error subsequent to any payment. In no event shall the Contractor or the Surety be released or exonerated from performance under this Contract when the County overpays the Contractor based upon any mistake, inaccuracy, error or falsification in any estimate that is included in any Request for Payment.

### 9.3.4 Issuance of Certificate of Payment

The Architect shall, within seven (7) days after receipt of the Contractor's Application for Payment, either approve such payment or notify the Contractor in writing of the Architect's reasons for withholding approval in whole or in part as provided in Article 9.6. The review of the Contractor's Application for Payment by the Architect is based on the Architect's observations at the Project and the data comprising the Application for Payment that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. In some cases, the Architect may act upon or rely on the evaluation of the

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Work by the Inspector. This review of Payment Applications is sometimes called a “Pencil Draft.” County’s return of a Pencil Draft shall constitute the County’s dispute of the Payment Application that has been submitted. Contractor shall promptly respond to Pencil Drafts or Contractor’s Payment Applications may be delayed. Contractor’s failure to promptly respond to a Pencil Draft shall qualify as a delay in the prompt payment of a Request for Payment or Request for Retention. The foregoing representations are subject to: (1) an evaluation of the Work for conformance with the Contract Documents, (2) results of subsequent tests and inspections, (3) minor deviations from the Contract Documents correctable prior to completion, and (4) specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute the Contractor’s verified representation that the Contractor is entitled to payment in the amount certified.

### **9.3.5 Payment of Undisputed Contract Payments**

In accordance with Public Contract Code section 7100, payments by the County to the Contractor for any and all undisputed amounts (including all Progress Payments, Final Payments or Retention Payment) is contingent upon submission of a proper and accurate Payment Application and the Contractor furnishing the County with a release of all Claims against the County related to such undisputed amounts. Disputed Contract Claims in stated amounts may be specifically excluded by the Contractor from the operation of the release. If, however, the Contractor specifically excludes any Claims, the Contractor shall provide details such as a specific number of disputed days or costs of any such exclusion in accordance with Articles 4.6 and 7.7.

## **9.4 APPLICATIONS FOR PROGRESS PAYMENTS**

### **9.4.1 Procedure**

9.4.1.1 *Application for Progress.* On or before the fifth (5th) day of each calendar month during the progress of the Work, Contractor shall submit to the Architect an itemized Application for Progress Payment for operations completed. Such application shall be notarized, if required, and supported by the following or such portion thereof as Architect requires:

1. The amount paid to the date of the Payment Application to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;
2. The amount being requested under the Payment Application by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;
3. The balance that will be due to each of such entities after said payment is made;
4. A certification that the As-Built Drawings and Annotated Specifications are current;
5. Itemized breakdown of Work done for the purpose of requesting partial payment;

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6. An updated or approved Baseline Schedule or other Schedule updates in conformance with Article 8;
7. Failure to submit an updated Schedule for the month or any previous month;
8. The additions to and subtractions from the Contract Price and Contract Time;
9. A summary of the Retention held;
10. Material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the County may require from time to time;
11. The percentage of completion of the Contractor's Work by line item;
12. An updated Schedule of Values from the preceding Application for Payment;
13. Prerequisites for Progress Payments; and
14. Any other information or documents reasonably requested by the County, Architect, Inspector or CM (if applicable).

9.4.1.2 *First Payment Request.* The following items, if applicable, must be completed before the first payment request will be accepted for processing:

1. Installation of the Project sign;
2. Receipt by Architect of Submittals;
3. Installation of field office;
4. Installation of temporary facilities and fencing;
5. Submission of documents listed in the Article 9.2 relating to Contract Price breakdown;
6. Preliminary schedule analysis, due within 10 days after Notice to Proceed;
7. Contractor's Baseline Schedule (to be CPM based in conformance with Article 8);
8. Schedule of unit prices, if applicable;
9. Submittal Schedule;
10. Copies of necessary permits;
11. Copies of authorizations and licenses from governing authorities;

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12. Initial progress report;
13. Surveyor qualifications;
14. Written acceptance of County's survey of rough grading, if applicable;
15. List of all Subcontractors, with names, license numbers, telephone numbers, and scope of work;
16. All bonds and insurance endorsements; and
17. Resumes of General Contractor's Project Manager, and if applicable, job site secretary, record documents recorder, and job site Superintendent.

9.4.1.3 *Second Payment Request.* The second payment request will not be processed until all Submittals and Shop Drawings have been accepted for review by the Architect.

9.4.1.4 *All Payment Requests.* No payment requests will be processed unless Contractor has submitted copies of the certified payroll records for the Work which correlates to the payment request and a proper CPM schedule pursuant to Article 8 is submitted.

9.4.1.5 *Final Payment Application (95%).* See Article 9.11.1

9.4.1.6 *Final Payment Application (100%).* See Article 9.11.3

### **9.5 STOP NOTICE CLAIMS AND WARRANTY OF TITLE**

The Contractor warrants title to all Work. The Contractor further warrants that all Work is free and clear of liens, claims, security interests, stop notices, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work. Failure to keep work free of liens, stop notices, claims, security interests or encumbrances is grounds to make a claim against Contractor's Payment and Performance Bond to immediately remedy and defend.

If a lien or stop notice of any nature should at any time be filed against the Work or any County property, by any entity which has supplied material or services at the request of the Contractor, Contractor and Contractor's Surety shall promptly, on demand by County and at Contractor's and Surety's own expense, take any and all action necessary to cause any such lien or stop notice to be released or discharged immediately therefrom.

If the Contractor fails to furnish to the County within ten (10) calendar days after written demand by the County, satisfactory evidence that a lien or stop notice has been so released, discharged, or secured, then County may discharge such indebtedness and deduct the amount required therefor, together with any and all losses, costs, damages, and attorney's fees and expense incurred or suffered by County from any sum payable to Contractor under the Contract. In addition, any liens, stop notices, claims, security interests or encumbrances shall trigger the indemnification requirements under Article 3.15 and the Agreement Form, and shall act as a trigger under Civil Code section 2778 and 2779 requiring reimbursement for any and all costs following the County's written demand has been made. Any withholdings by the County for stop notices in accordance with Civil Code section 9358 shall not be a basis by the Contractor to make a Claim for interest penalties under Public Contract Code sections 7107 or 20104.50.



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### **9.6 DECISIONS TO WITHHOLD PAYMENT**

#### **9.6.1 Reasons to Withhold Payment**

The County may withhold payment in whole, or in part, to the extent reasonably necessary to protect the County if, in the County's opinion, the representations to the County required by Article 9.4 cannot be made. The County may withhold payment, in whole, or in part, to such extent as may be necessary to protect the County from loss because of, but not limited to:

- a. Defective Work not remedied;
- b. Stop notices served upon the County;
- c. Liquidated Damages assessed against the Contractor;
- d. The cost of Completion of the Contract if there exists reasonable doubt that the Work can be Completed for the unpaid balance of any Contract Price or by the completion date;
- e. Damage to the County or other contractor;
- f. Unsatisfactory prosecution of the Work by the Contractor;
- g. Failure to store and properly secure materials;
- h. Failure of the Contractor to submit on a timely basis, proper and sufficient documentation required by the Contract Documents, including, without limitation, acceptable monthly progress schedules, Shop Drawings, Submittal schedules, Schedule of Values, Product Data and samples, proposed product lists, executed Change Order, Construction Change Documents, and verified reports;
- i. Failure of the Contractor to maintain As-Built Drawings;
- j. Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Payment Application;
- k. Unauthorized deviations from the Contract Documents (including but not limited to Unresolved Notices of Deviations;
- l. Failure of the Contractor to prosecute the Work in a timely manner in compliance with established progress schedules and completion dates.
- m. Failure to properly pay prevailing wages as defined in Labor Code section 1720, et seq.;
- n. Failure to properly maintain or clean up the Site;
- o. Payments to indemnify, defend, or hold harmless the County;

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- p. Any payments due to the County including but not limited to payments for failed tests, or utilities changes or permits;
- q. Failure to submit an acceptable Baseline Schedule or any Schedule or Schedule update in accordance with Article 8;
- r. Failure to pay Subcontractor or suppliers as required by Article 9.8.1
- s. Failure to secure warranties, including the cost to pay for warranties;
- t. Failure to provide releases from material suppliers or Subcontractors when requested to do so;
- u. Items deducted pursuant to Article 2.2;
- v. Incomplete Punch List items under Article 9.9.1.1 which have gone through the Article 2.2 process; or
- w. Allowances that have not been used.

### 9.6.2 Reallocation of Withheld Amounts

County may, in its discretion, apply any withheld amount to payment of outstanding claims or obligations as defined in Article 9.6.1 and 9.5. In so doing, County shall make such payments on behalf of Contractor. If any payment is so made by County, then such amount shall be considered as a payment made under Contract by County to Contractor and County shall not be liable to Contractor for such payments made in good faith. Such payments may be made without prior judicial determination of claim or obligation. County will render Contractor an accounting of such funds disbursed on behalf of Contractor.

If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to perform any provision thereof, County may, after ten (10) calendar days written notice to the Contractor and without prejudice to any other remedy make good such deficiencies. The County shall adjust the total Contract price by reducing the amount thereof by the cost of making good such deficiencies. If County deems it inexpedient to correct Work which is damaged, defective, or not done in accordance with Contract provisions, an equitable reduction in the Contract Price (of at least 150% of the estimated reasonable value of the nonconforming Work) shall be made therefor.

### 9.6.3 Payment After Cure

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

## **9.7 NONCONFORMING WORK**

Contractor shall promptly remove from premises all Work identified by County as failing to conform to the Contract whether incorporated or not. Contractor shall promptly replace and re-execute its own Work to comply with the Contract without additional expense to County and shall bear the expense of making good all Work of other contractors destroyed or damaged by such removal or replacement.

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If Contractor does not remove such Work which has been identified by County as failing to conform to the Contract Documents within a reasonable time, fixed by written notice, County may remove it and may store the material at Contractor's expense. If Contractor does not pay expenses of such removal within ten (10) calendar days' time thereafter, County may, upon ten (10) calendar days' written notice, sell such materials at auction or at private sale and shall account for net proceeds thereof, after deducting all costs and expenses that should have been borne by Contractor.

### **9.8 SUBCONTRACTOR PAYMENTS**

#### **9.8.1 Payments to Subcontractors**

No later than ten (10) days after receipt, or pursuant to Business and Professions Code section 7108.5, the Contractor shall pay to each Subcontractor, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

#### **9.8.2 No Obligation of County for Subcontractor Payment**

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

#### **9.8.3 Payment Not Constituting Approval or Acceptance**

An approved Request for Payment, a progress payment, a Certificate of Substantial Completion, or partial or entire use or occupancy of the Project by the County shall not constitute acceptance of Work that is not in accordance with the Contract Documents.

#### **9.8.4 Joint Checks**

County shall have the right, if necessary for the protection of the County, to issue joint checks made payable to the Contractor and Subcontractors and material or equipment suppliers. The joint check payees shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. In no event shall any joint check payment be construed to create any contract between the County and a Subcontractor of any tier, any obligation from the County to such Subcontractor, or rights in such Subcontractor against the County. The County may choose to issue joint checks at County's sole discretion and only after all the requirements of that particular school district and county are specifically met. Some school districts cannot issue joint checks, so the ability to issue joint checks depends on the school district and the specific circumstances.

### **9.9 COMPLETION OF THE WORK**

#### **9.9.1 Close-Out Procedures**

9.9.1.1 *Incomplete Punch Items.* When the Contractor considers the Work Substantially Complete (See Article 1.1.46 for definition of Substantially Complete), the Contractor shall prepare and submit to the County a comprehensive list of minor items to be completed or corrected (hereinafter "Incomplete Punch Items" or "Punch List"). The Contractor and/or its Subcontractors shall proceed promptly to complete and correct the Incomplete Punch Items listed. Failure to include an item on

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such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Contractor is aware of the following:

“RESPONSIBILITIES. IT IS THE DUTY OF THE CONTRACTOR TO COMPLETE THE WORK COVERED BY HIS OR HER CONTRACT IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS THEREFOR. THE CONTRACTOR IN NO WAY IS RELIEVED OF ANY RESPONSIBILITY BY THE ACTIVITIES OF THE ARCHITECT, ENGINEER, INSPECTOR OR AHJ IN THE PERFORMANCE OF SUCH DUTIES.

9.9.1.2 *Punch List Is Prepared Only After the Project Is Substantially Complete.* If any of the conditions noted in Article 1.1.46 as defining Substantial Completion are not met, the Inspector, Architect or County may reject Contractor’s Incomplete Punch Items as premature. If the Architect and Inspector commence review of Incomplete Punch Items, all rights are reserved until the Project actually meets the definition of Substantially Complete. Liquidated Damages, warranties, and other contractual rights are not affected by Incomplete Punch Items unless otherwise addressed in these General Conditions.

Once the Inspector and the Architect determine the Project is Substantially Complete, a Certificate of Substantial Completion shall be issued. The Inspector and Architect shall prepare a Punch List of items which is an inspection report of the Work, if any, required in order to complete the Contract Documents and ensure compliance with the AHJ Approved Plans so the Project may be Completed by the Contractor and a final Close-Out is approved. When all Work for the Project is Complete, including Punch Lists and all Work complies with the approved Contract Documents and Change Orders, the Project has reached Final Completion.

9.9.1.3 *Time for Completion of Punch List.* Contractor shall only be given a period of no more than thirty (30) days to complete the Punch List for the Project. During the Punch List period, the Contractor’s Superintendent and Project Manager shall remain engaged in the Project and shall not be removed or replaced. If the Punch List is not completed at the end of the Punch List time then Contractor shall issue a valued Punch List within 5 days after the date the Punch List time ends. If Contractor does not issue such a list, the County or Architect may issue a valued Punch List to the Contractor and withhold up to 150% of the value of the Punch List Work pursuant to Article 2.2 of this Agreement.

Failure to issue a timely written request for additional time to complete Punch List shall result in the deletion of the remaining Punch List Work pursuant to Article 2.2 and the issuance of a Deductive Change Order.

- a. Extension of Time to Complete Punch List. If Contractor cannot finish the Punch List Work during the time period allotted under Article 9.9.1.3, the Contractor may make a written request for a Non-Compensable Punch List time extension accompanied by an estimate of the number of additional days it will take to complete the Punch List Work for a written consent from the County to allow continued Punch List Work. Punch List time extensions are a maximum of thirty (30) days for each request and must be accompanied by an itemized valued Punch List.
- b. If there is no valued Punch List accompanying any request or if Contractor intends to undertake Punch List without the continued support and supervision of its Superintendent and Project Manager (as required under Article 3.2), the County, Construction Manager or Architect may issue a

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valued Punch List, reject the Punch List Time Extension and deduct 150% of the valued Punch List pursuant to Article 2.2 and proceed to Close-Out the Project. Contractor shall cease work on the Project and proceed to complete Contractor's Retention Payment Application and complete the Work for the Project required pursuant to Article 9.11.3.

9.9.1.4 *County Rejection of Written Request for Punch List Time Extensions.* Following sixty (60) Days of Punch List under Article 9.9.1.3, the County has the option of rejecting Punch List Time Extension requests. The County may proceed under Article 2.2 and deduct the value of remaining Punch List Work pursuant to Article 2.2. If the County rejects the Punch List Time Extension request then Contractor shall cease Work on the Project and proceed to Final Inspection pursuant to Article 9.11.2.

9.9.1.5 *Punch List Liquidated Damages to Compensate for Added County Project Costs.* If the total time utilized for Punch List exceeds sixty (60) days [the thirty (30) day period under Article 9.9.1.3 plus an additional thirty (30) day period that has been requested in writing], and the County grants an additional written Punch List Time Extension that exceeds sixty (60) days of Punch List, then Contractor shall be charged Liquidated Damages of at least \$750 per day for continued Punch List Work to partially compensate the Inspector, Architect, and Construction Manager's extended time on the Project. This Punch List Liquidated Damage number is based on anticipated cost for an Inspector on site and additional costs for the Architect and Construction Manager to reinspect Punch List items and perform the administration of the Close-out.

Contractor received thirty (30) days without any charges for Punch List Liquidated Damages and is placed on notice pursuant to this Article 9.9.1.5 that \$750 is due for each day of Punch List that exceeds sixty (60) days at \$750, a cost much lower than typical (and actual) costs for Inspection, Architect and Construction Manager time required during Punch List. Starting at ninety (90) days of Punch List (an excessive number of days to complete Punch List), the County shall be entitled to adjust Punch List Liquidated Damages to an estimate of the actual costs incurred to oversee, monitor and inspect the Punch List. If costs exceed \$750 per day, the anticipated extended contract charges for Inspection, Architect, Construction Manager, and any other costs that will be incurred due to the extended Punch List shall be itemized and a daily rate of Punch List Liquidated Damages shall be presented in writing to the Contractor within five (5) days following the receipt of a written request for Punch List Time Extension by the Contractor that extends the Punch List time beyond ninety (90) days. This written notice of actual Punch List Liquidated Damages may be provided to the Contractor at any time following the first written request for Punch List Time extension requested under Article 9.9.1.3. The adjusted actual Punch List Liquidated Damage amount shall be applicable as Punch List Liquidated Damages commencing on the ninetieth (90<sup>th</sup>) day of Punch List.

### 9.9.2 Close-Out Requirements for Final Completion of the Project

- a. Utility Connections. 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. As-Builts Up to Date and Complete. 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 As-Built Drawings

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1. The exact location and elevations of all covered utilities, including valves, cleanouts, etc. must be shown on As-Built Drawings
  2. Contractor is liable and responsible for inaccuracies in As-Built Drawings, even though they become evident at some future date.
  3. Upon completion of the Work and as a condition precedent to approval of Retention Payment, Contractor shall obtain the Inspector's approval of the "As-Built" information. When completed, Contractor shall deliver corrected sepias and/or a Diskette with an electronic file in a format acceptable to the County.
  4. County may withhold the cost to hire a draftsman and potholing and testing service to complete Record As-Built Drawings at substantial cost if the Contractor does not deliver a complete set of Record As-Built Drawings. This shall result in withholding of between \$10,000 to \$20,000 per building that does not have a corresponding Record As Built Drawing.
- c. Any Work not installed as originally indicated on Drawings
- d. Maintenance Manuals. At least thirty (30) days prior to final inspection, three (3) copies of complete operations and maintenance manuals, repair parts lists, service instructions for all electrical and mechanical equipment, and equipment warranties shall be submitted. All installation, operating, and maintenance information and Drawings shall be bound in 8½" x 11" binders. Provide a table of contents in front and all items shall be indexed with tabs. Each manual shall also contain a list of Subcontractors, with their addresses and the names of persons to contact in cases of emergency. Identifying labels shall provide names of manufactures, their addresses, ratings, and capacities of equipment and machinery.
1. Maintenance manuals shall also be delivered in electronic media for the Project. Any demonstration videos shall also be provided on electronic media.
- e. Inspection Requirements. Before calling for final inspection, Contractor shall determine that the following Work has been performed:
1. The Work has been completed;
  2. All fire/ life safety items are completed and in working order;
  3. Mechanical and electrical Work complete, fixtures in place, connected and tested;
  4. Electrical circuits scheduled in panels and disconnect switches labeled;
  5. Painting and special finishes complete;
  6. Doors complete with hardware, cleaned of protective film relieved of sticking or binding and in working order;

## **GENERAL CONDITIONS**

7. Tops and bottoms of doors sealed;
8. Floors waxed and polished as specified;
9. Broken glass replaced and glass cleaned;
10. Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site;
11. Work cleaned, free of stains, scratches, and other foreign matter, replacement of damaged and broken material;
12. Finished and decorative work shall have marks, dirt and superfluous labels removed;
13. Final cleanup, as in Article 3.12;
14. All Work pursuant to Article 9.11.2; and
15. Furnish a letter to County stating that the County's Representative or other designated person or persons have been instructed in working characteristics of mechanical and electrical equipment.

### 9.9.3 Costs of Multiple Inspections

More than two (2) requests of the County to make inspections required under Article 9.9.1 shall be considered an additional service of Architect, Inspector, Engineer or other consultants shall be the Contractor's responsibility pursuant to Article 4.5 and all subsequent costs will be prepared as a Deductive Change Order.

## **9.10 PARTIAL OCCUPANCY OR USE**

### 9.10.1 County's Rights

The County may occupy or use any completed or partially completed portion of the Work at any stage. The County and the Contractor shall agree in writing to the responsibilities assigned to each of them for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents. If County and Contractor cannot agree as to responsibilities such disagreement shall be resolved pursuant to Article 4.6. When the Contractor considers a portion complete, the Contractor shall prepare and submit a Punch List to the County as provided under Article 9.9.1.

### 9.10.2 Inspection Prior to Occupancy or Use

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

### 9.10.3 No Waiver

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Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

### **9.11 COMPLETION AND FINAL PAYMENT**

#### **9.11.1 Final Payment (95% Billing)**

The following items must be completed before the Final Payment Application will be accepted for processing at Substantial Completion of the Project:

- a. Inspector sign-off of each punch list item;
- b. The Project has reached the Punch List items under Article 9.9.1.2 and the Project has been determined to be Substantially Complete under Article 1.1.44;
- c. Removal of temporary facilities and services;
- d. Testing, adjusting and balance records are complete;
- e. Removal of surplus materials, rubbish, and similar elements;
- f. Changeover of door locks;
- g. Deductive items pursuant to Article 9.6 and Article 2.2; and
- h. Completion and submission of all final Change Orders for the Project.

#### **9.11.2 Final Inspection (Punch List Completion)**

Contractor shall comply with Punch List procedures under Article 9.9.1.1, and maintain the presence of Project Superintendent and Project Manager (not replacement project superintendent or project manager) until the Punch List is complete to ensure proper and timely completion of the Punch List. Under no circumstances shall Contractor demobilize its forces prior to completion of the Punch List.

Upon completion of the Work under Article 9.9.1, the Contractor shall notify the County and Architect, who shall again inspect such Work. If the Architect and the County find the Work contained in the Punch List acceptable under the Contract Documents, the Work shall have reached Final Completion. Architect shall notify Contractor, who shall then submit to the Architect its Application for Retention Payment. This Application for Retention Payment shall contain any deductions under Article 9.6, including but not limited to incomplete Punch List items under Article 9.9.1.

Upon receipt and approval of Application for Retention Payment, the Architect shall issue a Form 6 stating that to the best of its knowledge, information, and belief, and on the basis of its observations, inspections, and all other data accumulated or received by the Architect in connection with the Work, such Work has been completed in accordance with the Contract Documents. The County shall thereupon inspect such Work and either accept the Work as complete or notify the Architect and the Contractor in writing of reasons why the Work is not complete. Upon acceptance of the Work of the Contractor as fully complete (which, absent unusual circumstances, will occur when the Punch List items have been satisfactorily completed), the County shall record a Notice of Completion with the County



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Recorder, and the Contractor shall, upon receipt of payment from the County, pay the amounts due Subcontractors.

If the Architect and the County find that the Work contained in the Punch List is unacceptable, then Contractor shall issue a valued Punch List within 5 days after the date the Punch List time ends. If Contractor does not issue such a list, the County or Architect may issue a valued Punch List to the Contractor and withhold up to 150% of the value of the Punch List Work pursuant to Article 2.2 of this Agreement.

### 9.11.3 Retainage (100% Billing for the Entire Project)

The retainage, less any amounts disputed by the County or which the County has the right to withhold pursuant to the Contract Documents (including but not limited to incomplete Punch List items under Article 9.9.1), shall be paid after approval by the County of the Application for Retention Payment, after the satisfaction of the conditions set forth in Article 9, the Final Inspection under Article 9.11.2 is completed, and after thirty-five (35) days after the acceptance of the Work and recording of the Notice of Completion by County. No interest shall be paid on any retainage, or on any amounts withheld due to a failure of the Contractor to perform, in accordance with the terms and conditions of the Contract Documents, except as provided to the contrary in any escrow agreement between the County and the Contractor.

- a. Procedures for Application for Retention Payment. The following conditions must be fulfilled prior to release of Retention Payment:
  1. A full and final waiver or release of all stop notices in connection with the Work shall be submitted by Contractor, including a release of stop notice in recordable form, together with (to the extent permitted by law) a copy of the full and final release of all Stop Notice rights.
  2. The Contractor shall have made all corrections, including all Punch List Items, to the Work which are required to remedy any defects therein, to obtain compliance with the Contract Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of County required under the Contract Documents.
  3. Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, releases from the Surety and warranty bonds (if applicable) required by the Contract Documents for its portion of the Work.
  4. Contractor must have completed all requirements set forth in Article 9.9
  5. The Contractor shall have delivered to the County all manuals and materials required by the Contract Documents.
  6. The Contractor shall have completed final clean up as required by Article 3.12

## GENERAL CONDITIONS

7. Contractor shall have all deductive items under Article 9.6 and Article 2.2 submitted as part of the Retention Payment.

### 9.11.4 Recording of a Notice of Completion After Punch List Period and Final Inspection.

When the Work, or designated portion thereof, is complete or the County has completed the Article 9.6 and/or the Article 2.2 process, whichever occurs first, the County will file either a Notice of Completion or a Notice of Completion noting valued Punch List items. Valued Punch List items will be deducted from the Retention Payment.

During the time when Work is being performed on the Punch List, the Project does not meet the definition of "Complete" under Public Contract Code section 7107(c)(1) even if there is "beneficial occupancy" of the Project since that has been no "cessation of labor" on the Project. Completion of Punch List under this Article is not "testing, startup, or commissioning by the public entity or its agent." In other words, the continuing Punch List Work is Contractor labor on the Project until each and every item of Punch List Work is complete or the time periods under Article 9.9.1 have expired.

### 9.11.5 Warranties

Warranties required by the Contract Documents shall commence on the date of Completion of the entire Work. Warranty periods DO NOT commence at Substantial Completion or when a particular Subcontractor work is complete. No additional charges, extras, Change Orders, or Claims may be sought for warranties commencing from the Notice of Completion.

County shall have the right to utilize equipment, test, and operate as necessary for acclimation, or testing without voiding or starting warranties. Taking beneficial occupancy shall not start warranties except in the case where the County agrees, in writing, that warranties shall commence running or where the County is taking phased occupancy of specific buildings or areas and completes separate Punch Lists as further addressed in Article 4.2.7.

### 9.11.6 Time for Submission of Application for Final Payment and Retention Payment (Unilateral Processing of Final and Retention Payment Application).

If Contractor submits a Final Payment Application which fails to include deductive items under Article 9.6, the County or Architect shall note this defective request for Final Payment Application. The Contractor shall be notified that specific deductive items shall be included in the Final Payment Application. If Contractor either continues to submit the Final Payment Application without deductive items under Article 9.6, or a period of 14 calendar days passes after Contractor is provided written notice of deductive items for inclusion in Final Payment Application, then County may either alter the Final Payment Application and recalculate the math on the Final Payment Application to address the Article 9.6 deductive items or process a unilateral Final Payment Application.

### 9.11.7 Unilateral Release of Retention

After the recordation of the Notice of Completion, or within sixty (60) days following the completion of the Punch List or the expiration of the time for completion of Punch List under Article 9.9.1, if Contractor does not make an Application for Release of Retention, the County may unilaterally release retention less any deducts under Article 9.6 and/or Article 2.2, withholds due to stop notices, or withholdings due to other defective Work on the Project. County may also choose to unilaterally release

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Retention after deduction of 150% of any disputed items, which may also include items under Article 9.6 and 2.2. If a deduction pursuant to Article 9.6 is made from Retention, a letter deducting specific valued items shall be considered a notice of Default under the terms of the Escrow Agreement.

### **9.12 SUBSTITUTION OF SECURITIES**

The County will permit the substitution of securities in accordance with the provisions of Public Contract Code section 22300 as set forth in the form contained in the Bid Documents.

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## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **10.1 SAFETY PRECAUTIONS AND PROGRAMS**

#### **10.1.1 Contractor Responsibility**

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

Contractor shall take, and require Subcontractor to take, all necessary precautions for safety of workers on the Work and shall comply with all applicable federal, state, local and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where Work is being performed and to provide a safe and healthful place of employment. In addition to meeting all requirements of OSHA, Cal-OSHA, state, and local codes, Contractor shall furnish, erect and properly maintain at all times, as directed by County or 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 member of its organization on the Work, 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 person so designated shall be reported to County by Contractor. Contractor shall correct any violations of safety laws, rules, orders, standards, or regulations. Upon the issuance of a citation or notice of violation by the Division of Occupational Safety and Health, such violation shall be corrected promptly.

#### **10.1.2 Subcontractor Responsibility**

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

#### **10.1.3 Cooperation**

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

#### **10.1.4 Accident Reports**

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Subcontractors shall immediately, within two (2) days, report in writing to the Contractor all accidents whatsoever arising out of, or in connection with, the performance of the Work, whether on or off the Site, which caused death, personal injury, or property damage, giving full details and statements of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported within four (4) days by telephone or messenger. Contractor shall thereafter immediately, within two (2) days, report the facts in writing to the County and the Architect giving full details of the accident.

### 10.1.5 First-Aid Supplies at Site

The Contractor will provide and maintain at the Site first-aid supplies which complies with the current Occupational Safety and Health Regulations.

### 10.1.6 Material Safety Data Sheets and Compliance with Proposition 65

Contractor is required to have material safety data sheets available in a readily accessible place at the job site for any material requiring a material safety data sheet per the Federal "hazard communication" standard, or employees' "right-to-know law." The Contractor is also required to properly label any substance brought into the job site, and require that any person working with the material, or within the general area of the material, is informed of the hazards of the substance and follows proper handling and protection procedures.

Contractor is required to comply with the provisions of California Health and Safety Code section 25249, et seq., which requires the posting and giving of notice to persons who may be exposed to any chemical known to the State of California to cause cancer. The Contractor agrees to familiarize itself with the provisions of this Section, and to comply fully with its requirements.

### 10.1.7 Non-Utilization of Asbestos Material

NO ASBESTOS OR ASBESTOS-CONTAINING PRODUCTS SHALL BE USED IN THIS CONSTRUCTION OR IN ANY TOOLS, DEVICES, CLOTHING, OR EQUIPMENT USED TO EFFECT THIS CONSTRUCTION.

Asbestos and/or asbestos-containing products shall be defined as all items containing, but not limited to, chrysotile, amosite, anthophyllite, tremolite, and antinolite.

Any or all material containing greater than one-tenth of one percent (>.1%) asbestos shall be defined as asbestos-containing material.

All Work or materials found to contain asbestos or Work or material installed with asbestos-containing equipment will be immediately rejected and this Work will be removed at no additional cost to the County.

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

The asbestos removal contractor shall be an EPA 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.

## **GENERAL CONDITIONS**

The asbestos consultant shall be chosen and approved by the County, who shall have sole discretion and final determination in this matter.

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

Interface of Work under this Contract with Work containing asbestos shall be executed by the Contractor at his risk and at his discretion, with full knowledge of the currently accepted standards, hazards, risks, and liabilities associated with asbestos work and asbestos-containing products. By execution of this Contract, the Contractor acknowledges the above and agrees to hold harmless County and its assigns for all asbestos liability which may be associated with this work and agrees to instruct his employees with respect to the above-mentioned standards, hazards, risks, and liabilities.

### **10.2 SAFETY OF PERSONS AND PROPERTY**

#### **10.2.1 The Contractor**

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

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

Contractor is constructive owner of Project site as more fully discussed in Article 6.2.

#### **10.2.2 Contractor Notices**

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

#### **10.2.3 Safety Barriers and Safeguards**

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

#### **10.2.4 Use or Storage of Hazardous Material**

When use or storage of explosives, other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel. The Contractor shall notify the County

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any time that explosives or hazardous materials are expected to be stored on Site. Location of storage shall be coordinated with the County and local fire authorities.

### 10.2.5 Protection of Work

The Contractor and Subcontractors shall continuously protect the Work, the County's property, and the property of others, from damage, injury, or loss arising in connection with operations under the Contract Documents. The Contractor and Subcontractors, at their own expense, shall make good any such damage, injury, or loss, except such as may be solely due to, or caused by, agents or employees of the County.

The Contractor, at Contractor's expense, will remove all mud, water, or other elements as may be required for the proper protection and prosecution of its Work.

Contractor shall take adequate precautions to protect existing roads, sidewalks, curbs, pavements, utilities, adjoining property and structures (including, without limitation, protection from settlement or loss of lateral support), and to avoid damage thereto, and repair any damage thereto caused by construction operations. All permits, licenses, or inspection fees required for such repair Work shall be obtained and paid for by Contractor.

### 10.2.6 Requirements for Existing Sites

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

- a. Provide substantial barricades around any shrubs or trees indicated to be preserved.
- b. Take preventive measures to eliminate objectionable dust, noise, or other disturbances.
- c. Confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits or directions of Architect; and not interfere with the Work or unreasonably encumber premises or overload any structure with materials; and enforce all instructions of County and Architect regarding signs, advertising, fires, and smoking and require that all workers comply with all regulations while on the Project site.
- d. Take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed by accident, they shall be replaced by an approved land surveyor or civil engineer and all maps and records required therefrom shall be filed with county and local authorities, at no cost to the County. All filing and plan check fees shall be paid by Contractor.
- e. Provide County on request with Contractor's written safety program and safety plan for each site.

### 10.2.7 Shoring and Structural Loading

The Contractor shall not impose structural loading upon any part of the Work under construction or upon existing construction on or adjacent to the Site in excess of safe limits, or loading such

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

### 10.2.8 Conformance within Established Limits

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

### 10.2.9 Subcontractor Enforcement of Rules

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

### 10.2.10 Site Access

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

### 10.2.11 Security Services.

The Contractor shall be responsible for providing security services for the Site as needed for the protection of the Site and as determined in the County's sole discretion.

## **10.3 EMERGENCIES**

### 10.3.1 Emergency Action

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

### 10.3.2 Accident Reports

The Contractor shall promptly report in writing to the County all accidents arising out of or in connection with the Work, which caused death, personal injury, or property damage, giving full details



## **GENERAL CONDITIONS**

and statements of any witnesses in conformance with Article 10.1.4. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported in accordance with Article 10.1.4, immediately by telephone or messenger to the County.

### **10.4 HAZARDOUS MATERIALS**

#### **10.4.1 Discovery of Hazardous Materials**

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

#### **10.4.2 Hazardous Material Work Limitations**

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

#### **10.4.3 Indemnification by Contractor for Hazardous Material Caused by Contractor**

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

#### **10.4.4 Terms of Hazardous Material Provision**

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

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## **ARTICLE 11 INSURANCE AND BONDS**

### **11.1 CONTRACTOR'S LIABILITY INSURANCE**

#### **11.1.1 Insurance Requirements**

Before the commencement of the Work, the Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in California with a financial rating of at least an A-VIII status as rated in the most recent edition of Best's Insurance Reports or as amended by the Supplementary General Conditions, such insurance as will protect the County from claims set forth below, which may arise out of or result from the Contractor's Work under the Contract and for which the Contractor may be legally liable, whether such Work are by the Contractor, by a Subcontractor, by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. Any required insurance shall not contain any exclusion that applies to the type of work performed by the Contractor under the Contract Documents.

- a. Claims for damages because of bodily injury, sickness, disease, or death of any person County would require indemnification and coverage for employee claim;
- b. Claims for damages insured by usual personal injury liability coverage, which are sustained by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor or by another person;
- c. Claims for damages because of injury or destruction of tangible property, including loss of use resulting therefrom, arising from operations under the Contract Documents;
- d. Claims for damages because of bodily injury, death of a person, or property damage arising out of the ownership, maintenance, or use of a motor vehicle, all mobile equipment, and vehicles moving under their own power and engaged in the Work;
- e. Claims involving contractual liability applicable to the Contractor's obligations under the Contract Documents, including liability assumed by and the indemnity and defense obligations of the Contractor and the Subcontractors; and
- f. Claims involving Completed Operations, Independent Contractors' coverage, and Broad Form property damage, without any exclusions for collapse, explosion, demolition, underground coverage, and excavating. (XCU)
- g. Claims involving sudden or accidental discharge of contaminants or pollutants.

#### **11.1.2 Specific Insurance Requirements**

Contractor shall take out and maintain and shall require all Subcontractors, if any, whether primary or secondary, to take out and maintain:

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Comprehensive General Liability Insurance with a combined single limit per occurrence of not less than \$2,000,000.00 or Commercial General Liability Insurance which provides limits of not less than:

- (a) Per occurrence (combined single limit) \$2,000,000.00  
.....
- (b) Project Specific Aggregate (for this Project only) \$2,000,000.00  
.....
- (c) Products and Completed Operations (aggregate) \$2,000,000.00  
.....
- (d) Personal and Advertising Injury Limit \$1,000,000.00  
.....

Insurance Covering Special Hazards

The following Special hazards shall be covered by riders or riders to above mentioned public liability insurance or property damage insurance policy or policies of insurance, in amounts as follows:

- (a) Automotive and truck where operated in amounts \$1,000,000.00  
.....
- (b) Material Hoist where used in amounts \$1,000,000.00  
.....
- (c) Explosion, Collapse and Underground (XCU coverage) \$1,000,000.00  
.....
- (d) Hazardous Materials \$1,000,000.00  
.....

In addition, provide Excess Liability Insurance coverage in the amount of Four Million Dollars (\$4,000,000.00).

11.1.3 Subcontractor Insurance Requirements

The Contractor shall require its Subcontractors to take out and maintain public liability insurance and property damage insurance required under Article 11.1 in like amounts. A “claims made” or modified “occurrence” policy shall not satisfy the requirements of Article 11.1 without prior written approval of the County.

11.1.4 Additional Insured Endorsement Requirements

The Contractor shall name, on any policy of insurance required under Article 11.1, the County, CM, Architect, Inspector, the State of California, their officers, employees, agents, volunteers and independent contractors as additional insureds. Subcontractors shall name the Contractor, the County,

## **GENERAL CONDITIONS**

Architect, Inspector, the State of California, their officers, employees, agents, volunteers and independent contractors as additional insureds. The Additional Insured Endorsement included on all such insurance policies shall be an ISO CG 20 10 (04/13), or an ISO CG 20 38 (04/13), or their equivalent as determined by the County in its sole discretion, and must state that coverage is afforded the additional insured with respect to claims arising out of operations performed by or on behalf of the insured. If the additional insureds have other insurance which is applicable to the loss, such other insurance shall be on an excess or contingent basis. The insurance provided by the Contractor pursuant to 11.1 must be designated in the policy as primary to any insurance obtained by the County. The amount of the insurer's liability shall not be reduced by the existence of such other insurance.

### **11.2 WORKERS' COMPENSATION INSURANCE**

During the term of this Contract, the Contractor shall provide workers' compensation and employer's liability insurance for all of the Contractor's employees engaged in Work under this Contract on or at the Site of the Project and, in case any of the Contractor's Work is subcontracted, the Contractor shall require the Subcontractor to provide workers' compensation insurance for all the Subcontractor's employees engaged in Work under the subcontract. Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by the Contractor's insurance. In case any class of employees engaged in Work under this Contract on or at the Site of the Project is not protected under the Workers' Compensation laws, the Contractor shall provide or cause a Subcontractor to provide insurance coverage for the protection of those employees not otherwise protected. The Contractor shall file with the County certificates of insurance as required under Article 11.6 and in compliance with Labor Code § 3700.

Workers' compensation limits as required by the Labor Code, but not less than \$1,000,000 and employers' liability limits of \$1,000,000 per accident for bodily injury or disease.

### **11.3 BUILDER'S RISK/ "ALL RISK" INSURANCE**

#### **11.3.1 Course-of-Construction Insurance Requirements**

The Contractor, during the progress of the Work and until final acceptance of the Work by County upon completion of the entire Contract, shall maintain Builder's Risk, Course of Construction or similar first party property coverage issued on a replacement cost value basis consistent with the total replacement cost of all insurable Work and the Project included within the Contract Documents. Coverage is to insure against all risks of accidental direct physical loss, and must include, by the basic grant of coverage or by endorsement, the perils of vandalism, malicious mischief (both without any limitation regarding vacancy or occupancy), fire, sprinkler leakage, civil authority, sonic boom, earthquake, flood, collapse, wind, lightning, smoke and riot. The coverage must include debris removal, demolition, increased costs due to enforcement of building ordinance and law in the repair and replacement of damage and undamaged portions of the property, and reasonable costs for the Architect's and engineering services and expenses required as a result of any insured loss upon the Work and Project which is the subject of the Contract Documents, including completed Work and Work in progress, to the full insurable value thereof. Such insurance shall include the County and the Architect as additional named insureds, and any other person with an insurable interest as designated by the County.

The Contractor shall submit to the County for its approval all items deemed to be uninsurable. The risk of the damage to the Work due to the perils covered by the "Builder's Risk/All Risk" Insurance, as well as any other hazard which might result in damage to the Work, is that of the Contractor and the Surety, and no Claims for such loss or damage shall be recognized by the County nor will such loss or damage excuse the complete and satisfactory performance of the Contract by the Contractor.

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### **11.4 FIRE INSURANCE**

Before the commencement of the Work, the Contractor shall procure, maintain, and cause to be maintained at the Contractor's expense, fire insurance on all Work subject to loss or damage by fire. The amount of fire insurance shall be sufficient to protect the Project against loss or damage in full until the Work is accepted by the County. This requirement may be waived upon confirmation by the County that such coverage is provided under the Builder's Risk Insurance being provided.

### **11.5 AUTOMOBILE LIABILITY**

11.5.1 The County, Architect and Construction Manager, Inspectors, their directors, officers, employees, agents and volunteers shall be covered as additional insureds with respect to the ownership, operation, maintenance, use, loading or unloading of any auto owned, leased, hired or borrowed by the Contractor or for which the Contractor is responsible. Such insurance coverage shall be primary and non-contributory insurance as respects the County, Architect, Construction Manager, Project Inspector, their directors, officers, employees, agents and volunteers, or if excess, shall stand in an unbroken chain of coverage excess of the Contractor's scheduled underlying coverage. Any insurance or self-insurance maintained by the County, Architect, Construction Manager, Project Inspector, their directors, officers, employees, agents and volunteers shall be excess of the Contractor's insurance and shall not be called upon to contribute with it. The insurer shall agree to waive all rights of subrogation against the County, Architect, Construction Manager, Project Inspector, their directors, officers, employees, agents and volunteers for losses paid under the terms of the insurance policy that arise from Work performed by the Contractor.

11.5.2 Insurance Services Office Business Auto Coverage Form Number CA 0001, Code 1 (any auto) is required. Comprehensive Automobile Liability insurance to include all autos, owned, non-owned, and hired, with limits of \$1,000,000 per accident for bodily injury and property damage.

### **11.6 OTHER INSURANCE**

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

### **11.7 PROOF OF INSURANCE**

The Contractor shall not commence Work nor shall it allow any Subcontractor to commence Work under this Contract until all required insurance and certificates have been obtained and delivered in duplicate to the County for approval subject to the following requirements:

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

“This policy and any coverage shall not be suspended, voided, non-renewed, canceled, or reduced in required limits of liability or amounts of insurance or coverage until notice has been mailed via certified mail to the County. Date of cancellation or reduction may not be less than thirty (30) days after the date of mailing notice.”

## **GENERAL CONDITIONS**

- b. Certificates of insurance shall state in particular those insured, the extent of insurance, location and operation to which the insurance applies, the expiration date, and cancellation and reduction notices.
- c. Certificates of insurance shall clearly state that the County and the Architect are named as additional insureds under the policy described and that such insurance policy shall be primary to any insurance or self-insurance maintained by County.
- d. The Contractor and its Subcontractors shall produce a certified copy of any insurance policy required under this Section upon written request of the County.

### **11.8 COMPLIANCE**

In the event of the failure of Contractor to furnish and maintain any insurance required by this Article 11, the Contractor shall be in default under the Contract. Compliance by Contractor with the requirement to carry insurance and furnish certificates or policies evidencing the same shall not relieve the Contractor from liability assumed under any provision of the Contract Documents, including, without limitation, the obligation to defend and indemnify the County and the Architect.

### **11.9 WAIVER OF SUBROGATION**

Contractor waives (to the extent permitted by law) any right to recover against the County for damages to the Work, any part thereof, or any and all claims arising by reason of any of the foregoing, but only to the extent that such damages and/or claims are covered by property insurance and only to the extent of such coverage (which shall exclude deductible amounts) by insurance actually carried by the County.

The provisions of this Article are intended to restrict each party to recovery against insurance carriers only to the extent of such coverage and waive fully and for the benefit of each, any rights and/or claims which might give rise to a right of subrogation in any insurance carrier. The County and the Contractor shall each obtain in all policies of insurance carried by either of them, a waiver by the insurance companies thereunder of all rights of recovery by way of subrogation for any damages or claims covered by the insurance.

### **11.10 PERFORMANCE AND PAYMENT BONDS**

#### **11.10.1 Bond Requirements**

Unless otherwise specified in the Supplemental Conditions, prior to commencing any portion of the Work, the Contractor shall furnish separate Payment and Performance Bonds for its portion of the Work which shall cover 100% faithful performance of and payment of all obligations arising under the Contract Documents and/or guaranteeing the payment in full of all claims for labor performed and materials supplied for the Work. All bonds shall be provided by a corporate Surety authorized and admitted to transact business in California as sureties.

To the extent, if any, that the Contract Price is increased in accordance with the Contract Documents, the Contractor shall, upon request of the County, cause the amount of the bonds to be increased accordingly and shall promptly deliver satisfactory evidence of such increase to the County. To the extent available, the bonds shall further provide that no change or alteration of the Contract Documents (including, without limitation, an increase in the Contract Price, as referred to above), extensions of time, or

## **GENERAL CONDITIONS**

modifications of the time, terms, or conditions of payment to the Contractor will release the Surety. If the Contractor fails to furnish the required bonds, the County may terminate the Contract for cause.

### 11.10.2 Surety Qualification

Only bonds executed by admitted Surety insurers as defined in Code of Civil Procedure § 995.120 shall be accepted. Surety must be a California-admitted Surety and listed by the U.S. Treasury with a bonding capacity in excess of the Project cost.

### 11.10.3 Alternate Surety Qualifications

If a California-admitted Surety insurer issuing bonds does not meet these requirements, the insurer will be considered qualified if it is in conformance with § 995.660 of the California Code of Civil Procedure and proof of such is provided to the County.

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## **ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

### **12.1 COMPLIANCE WITH TITLE 24 INSTALLATION REQUIREMENTS**

Contractor is aware of the requirements governing Contractor's Work:

#### **Duties of the Contractor.**

(a) **Responsibilities.** It is the duty of the contractor to complete the Work covered by his or her contract in accordance with the approved Plans and Specifications therefore. The contractor in no way is relieved of any responsibility by the activities of the architect, engineer, Inspector or AHJ in the performance of such duties.

(b) **Performance of the Work.** The contractor shall carefully study the approved Plans and Specifications and shall plan a schedule of operations well ahead of time. If at any time it is discovered that Work is being done which is not in accordance with the approved Plans and Specifications, the contractor shall correct the Work immediately. All inconsistencies or items which appear to be in error in the Plans and Specifications shall be promptly called to the attention of the architect or registered engineer, through the Inspector, for interpretation or correction. In no case, however, shall the instruction of the architect or registered engineer be construed to cause Work to be done which is not in conformity with the approved Plans, Specifications, and Change Orders. The contractor must notify the Project Inspector, in advance, of the commencement of construction of each and every aspect of the Work.

#### **12.1.1 Issuance of Notices of Non-Compliance**

The Inspector may issue a Notice of Non-Compliance on the Project indicating deviation from Plans and Specifications. It is Contractor's responsibility to correct all deviations from the approved Plans and Specifications unless the County has issued an Immediate Change Directive. In such case, the Contractor shall proceed with the Work with the understandings of the County as set forth in the ICD and as specifically noted in Article 7.3.

### **12.2 SPECIAL NOTICE OF AMERICAN'S WITH DISABILITIES ACT**

Some of the requirements in the Plans and Specifications are meant to comply with the Americans with Disabilities Act ("ADA"). The requirements of the ADA are technical in nature and may appear to be minor in nature (i.e. whether a walkway or ramp has a 2% cross-slope). Contractor is warned that even the slightest deviation from the specific requirements from the ADA is considered a Civil Rights violation and subjects the County to fines of three times actual damages sustained by a handicap individual or up to \$4,000 per violation and attorney's fees required to enforce the ADA violation. As a result of the significant liability and exposure associated with ADA aspects of the Contract, Contractor shall take special care to meet all ADA requirements detailed in the Plans and Specifications. Failure to comply with ADA rules that results in a Notice of Non-Compliance shall be repaired to meet ADA requirements promptly. In addition, any ADA violations that are not identified by Inspector or Architect that are later identified shall be repaired and charged back to the Contractor through a Deductive Change Order.

#### **12.2.1 Indemnification of ADA Claims**



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Contractor shall indemnify, hold harmless and defend the County from ADA claims arising from the failure to comply with the Plans and Specifications. Further, any withholdings for ADA violations under Article 9.6 shall include potential redesign costs and an accelerated repair costs due to the potential for ADA claims arising from AHJ posting of ADA violations on the Project.

### **12.3 UNCOVERING OF WORK**

#### **12.3.1 Uncovering Work for Required Inspections**

Work shall not be covered without the Inspector's review and the Architect's knowledge that the Work conforms with the requirements of the approved Plans and Specifications (except in the case of an ICD under Article 7.3). Inspector must be timely notified of inspections and of new areas so Work can be inspected at least 48 hours before opening a new area. An Inspector must comply with AHJ protocols for phase of Work or a Notice of Deviation will be issued requiring the Work that was not inspected be uncovered for inspection. Thus, if a portion of the Work is covered without inspection or Architect approval, is subject to a Notice of Non-Compliance for being undertaken without inspection, or otherwise not in compliance with the Contract Documents, after issuance of a Written Notice of Non-Compliance or a written notice to uncover Work, Contractor shall promptly uncover all Work (which includes furnishing all necessary facilities, labor, and material) for the Inspector's or the Architect's observation and such Work shall be replaced at the Contractor's expense without change in the Contract Sum or Time.

#### **12.3.2 Costs for Inspections Not Required**

If a portion of the Work has been covered is believed to be Non-Conforming to the Plans and Specifications, even if the Inspection Form/Report for the category of Work has been signed by the Inspector, the Inspector or the Architect may request to see such Work, and it shall be promptly uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncover and replacement shall, by appropriate Change Order and shall, be charged to the County. If such Work is not in accordance with Contract Documents, the Contractor shall be responsible for all costs to uncover the Work, delays incurred to uncover the Work, and Contractor shall pay all costs to correct the Non-Conforming construction condition unless the condition was caused by the County or a separate contractor, in which event the County shall be responsible for payment of such costs to the Contractor.

### **12.4 CORRECTION OF WORK**

#### **12.4.1 Correction of Rejected Work**

The Contractor shall promptly correct the Work rejected by the Inspector or the County upon recommendation of the Architect as failing to conform to the requirements of the Contract Documents, whether observed before or after Completion and whether or not Fabricated, installed, or completed. The Contractor shall bear costs of correcting the rejected Work, including cost for delays that may be incurred by Contractor or Subcontractors, the cost for additional testing, inspections, and compensation for the Inspector's or the Architect's services and expenses made necessary thereby (including costs for preparing a CCD, AHJ CCD review fees, and additional inspection and special inspection costs).

#### **12.4.2 One-Year Warranty Corrections**

If, within one (1) year after the date of Completion of the Work or a designated portion thereof, or after the date for commencement of warranties established under Article 9.9.1, or by the terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not

## **GENERAL CONDITIONS**

in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the County to do so unless the County has previously given the Contractor a written acceptance of such condition. This period of one (1) year shall be extended with respect to portions of the Work first performed after Completion by the period of time between Completion and the actual performance of the Work. This obligation under this Article 12.4.2 shall survive acceptance of the Work under the Contract and termination of the Contract. The County shall give such notice promptly after discovery of the condition.

### 12.4.3 County's Rights if Contractor Fails to Correct

If the Contractor fails to correct nonconforming Work within a reasonable time, the County may correct the Work and seek a Deductive Change Order, pursuant to Article 9.6 or Article 2.2.

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### **ARTICLE 13 MISCELLANEOUS PROVISIONS**

#### **13.1 GOVERNING LAW**

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

#### **13.2 SUCCESSORS AND ASSIGNS**

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

#### **13.3 WRITTEN NOTICE**

In the absence of specific notice requirements in the Contract Documents, written notice shall be deemed to have been duly served if delivered in person to the individual, member of the firm or entity, or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified mail to the last business address known to the party giving notice.

#### **13.4 RIGHTS AND REMEDIES**

##### **13.4.1 Duties and Obligations Cumulative**

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

##### **13.4.2 No Waiver**

No action or failure to act by the Inspector, the County, or the Architect shall constitute a waiver of a right or duty afforded them under the Contract Documents, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

#### **13.5 TESTS AND INSPECTIONS**

##### **13.5.1 Compliance**

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

##### **13.5.2 Independent Testing Laboratory**

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The County will select and pay an independent testing laboratory to conduct all tests and inspections. Selection of the materials required to be tested shall be made by the laboratory or the County's representative and not by the Contractor. See Articles 3.13.1 and 4.3.6 regarding costs or expenses of inspection or testing outside of the Project Site.

### 13.5.3 Advance Notice to Inspector

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

### 13.5.4 Testing Off-Site

Any material shipped by the Contractor from the source of supply, prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said Inspector that such testing and inspection will not be required, shall not be incorporated in the Work.

### 13.5.5 Additional Testing or Inspection

If the Inspector, the Architect, the County, or public authority having jurisdiction determines that portions of the Work require additional testing, inspection, or approval not included under Article 13.5.1, the Inspector will, upon written authorization from the County, make arrangements for such additional testing, inspection, or approval. The County shall bear such costs except as provided in Articles 13.5.6 and 13.5.7.

### 13.5.6 Costs for Retesting

If such procedures for testing, inspection, or approval under Articles 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs arising from such failure, including those of re-testing, re-inspection, or re-approval, including, but not limited to, compensation for the Architect's services and expenses. Any such costs shall be paid by the County, invoiced to the Contractor, and deducted from the next Progress Payment.

### 13.5.7 Costs for Premature Test

In the event the Contractor requests any test or inspection for the Project and is not completely ready for the inspection, the Contractor shall be invoiced by the County for all costs and expenses resulting from that testing or inspection, including, but not limited to, the Inspector's and Architect's fees and expenses, and the amount of the invoice shall be deducted from the next Progress Payment.

## **13.6 TRENCH EXCAVATION**

### 13.6.1 Trenches Greater Than Five Feet

Pursuant to Labor Code section 6705, if the Contract Price exceeds \$25,000 and involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall, in advance of

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excavation, submit to the County or a registered civil or structural engineer employed by the County or Architect, a detailed plan showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches.

### 13.6.2 Excavation Safety

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

### 13.6.3 No Tort Liability of County

Pursuant to Labor Code § 6705, nothing in this Article shall impose tort liability upon the County or any of its employees.

### 13.6.4 No Excavation without Permits

The Contractor shall not commence any excavation Work until it has secured all necessary permits including the required CAL OSHA excavation/shoring permit. Any permits shall be prominently displayed on the Site prior to the commencement of any excavation.

## **13.7 WAGE RATES, TRAVEL, AND SUBSISTENCE**

### 13.7.1 Wage Rates

Pursuant to the provisions of Article 2 (commencing at § 1720), Chapter 1, Part 7, Division 2, of the Labor Code, the County has obtained the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public works project is to be performed for each craft, classification, or type of worker needed for this Project from the Director of the Department of Industrial Relations (“Director”). These rates are on file at the administrative office of the County and are also available from the Director of the Department of Industrial Relations. Copies will be made available to any interested party on request. The Contractor shall post a copy of such wage rates at appropriate, conspicuous, weatherproof points at the Site.

Any worker employed to perform Work on the Project, but such Work is not covered by any classification listed in the published general prevailing wage rate determinations or per diem wages determined by the Director of the Department of Industrial Relations, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to the employment of such person in such classification.

### 13.7.2 Holiday and Overtime Pay

Holiday and overtime work, when permitted by law, shall be paid for at the rate set forth in the prevailing wage rate determinations issued by the Director of the Department of Industrial Relations or at least one and one-half (1½) times the specified basic rate of per diem wages, plus employer payments, unless otherwise specified in the Contract Documents or authorized by law.

### 13.7.3 Wage Rates Not Affected by Subcontracts

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

### 13.7.4 Per Diem Wages

The Contractor shall pay and shall cause to be paid to each worker needed to execute the Work on the Project per diem wages including, but not limited to, employer payments for health and welfare, pensions, vacation, travel time and subsistence pay as provided for in Labor Code §1773.1.

### 13.7.5 Forfeiture and Payments

Pursuant to Labor Code §1775, the Contractor shall forfeit to the County, not more than Two Hundred Dollars (\$200.00) for each calendar day, or portion thereof, for each worker paid less than the prevailing wages rates as determined by the Director of the Department of Industrial Relations, for the work or craft in which the worker is employed for any Work done under the Agreement by the Contractor or by any Subcontractor under it. The amount of the penalty shall be determined by the Labor Commissioner and shall be based on consideration of: (1) whether the Contractor or Subcontractor's failure to pay the correct rate of per diem wages was a good faith mistake and, if so, the error was promptly and voluntarily correct upon being brought to the attention of the Contractor or Subcontractor; and (2) whether the Contractor or Subcontractor has a prior record of failing to meet its prevailing wage obligations.

### 13.7.6 Monitoring and Enforcement by Labor Commissioner

Monitoring and enforcement of the prevailing wage laws and related requirements will be performed by the Labor Commissioner/ Department of Labor Standards Enforcement (DLSE). The Contractor and all subcontractors shall be required to furnish, at least monthly, certified payroll records directly to the Labor Commissioner in accordance with Labor Code section 1771.4. All payroll records shall be furnished in a format required by the Labor Commissioner. The Contractor and all subcontractors must sign up for, and utilize, the Labor Commissioner's electronic certified payroll records submission system. The County will have direct and immediate access to all CPRs for the Project that are submitted through the Labor Commissioner's system. The County can use this information for any appropriate purpose, including monitoring compliance, identifying suspected violations, and responding to Public Records Act requests.

The Labor Commissioner/ DLSE may conduct various compliance monitoring and enforcement activities including, but not limited to, confirming the accuracy of payroll records, conducting worker interviews, conducting audits, requiring submission of itemized statements prepared in accordance with Labor Code section 226, and conducting random in-person inspections of the Project site ("On-Site Visits"). On-Site Visits may include inspections of records, inspections of the Work site and observation of work activities, interviews of workers and others involved with the Project, and any other activities deemed necessary by the Labor Commissioner/DLSE to ensure compliance with prevailing wage requirements. The Labor Commissioner/DLSE shall have free access to any construction site or other place of labor and may obtain any information or statistics pertaining to the lawful duties of the Labor Commissioner/DLSE.

Any lawful activities conducted or any requests made by the Labor Commissioner/DLSE shall not be the basis for any delays, claims, costs, damages or liability of any kind against the County by the Contractor. Contractor and all subcontractors shall cooperate and comply with any lawful requests by

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the Labor Commissioner/ DLSE. The failure of the Labor Commissioner, DLSE, or any other entity related to the Department of Industrial Relations to comply with any requirement imposed by the California Code of Regulations, Title 8, Chapter 8 shall not of itself constitute a defense to the failure to pay prevailing wages or to comply with any other obligation imposed by Division 2, Part 7, Chapter 1 of the Labor Code.

Prior to commencing any Work on the Project, the Contractor shall post the required notice/poster required under the California Code of Regulations and Labor Code section 1771.4 in both English and Spanish at a conspicuous, weatherproof area at the Project site. The required notice/poster is available on the Labor Commissioner's website.

### **13.8 RECORDS OF WAGES PAID**

#### **13.8.1 Payroll Records**

- a. Pursuant to §1776 of the Labor Code, the Contractor and each Subcontractor shall keep an accurate payroll record showing the name, address, social security number, work classification and straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker or other employee employed by him or her in connection with the Project.

All payroll records as specified in Labor Code §1776 of the Contractor and all Subcontractors shall be certified and furnished directly to the Labor Commissioner in accordance with Labor Code §1771.4(a)(3) on a monthly basis (or more frequently if required by the County or the Labor Commissioner) and in a format prescribed by the Labor Commissioner. Payroll records as specified in Labor Code §1776 shall be certified and submitted to the County with each application for payment. All payroll records shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:

1. A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.
2. A certified copy of all payroll records shall be made available for inspection or furnished upon request to a representative of County, the Division of Labor Standards Enforcement or the Division of Apprenticeship Standards of the Department of Industrial Relations.
3. A certified copy of all payroll records shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through the County, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to Paragraph (2) above, the requesting party shall, prior to being provided the records, reimburse the costs, according to law for the preparation by the Contractor, Subcontractor(s), and the entity through which the request was made. The public shall not be given access to such records at the principal office of the Contractor.

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- b. The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the Division of Labor Standards Enforcement.
- c. The Contractor or Subcontractor(s) shall file a certified copy of all payroll records with the entity that requested such records within 10 calendar days after receipt of a written request.
- d. Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the County, 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. The name and address of the Contractor awarded the Contract or the Subcontractor(s) performing the Contract shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code) shall be marked or obliterated only to prevent disclosure of an individual's name and social security number. Notwithstanding any other provision of law, agencies that are included in the Joint Enforcement Strike Force on the Underground Economy established pursuant to Section 329 of the Unemployment Insurance Code and other law enforcement agencies investigating violations of law shall, upon request, be provided non-redacted copies of certified payroll records.
- e. The Contractor shall inform the County of the location of all payroll records, including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.
- f. The Contractor or Subcontractor(s) shall have 10 calendar days in which to comply subsequent to receipt of a written notice requesting payroll records. In the event that the Contractor or Subcontractor(s) fails to comply within the 10-day period, the Contractor or Subcontractor(s) shall, as a penalty to the County, forfeit One Hundred Dollars (\$100.00) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due.

Responsibility for compliance with this Article shall rest upon the Contractor.

### 13.8.2 Withholding of Contract Payments & Penalties

The County may withhold or delay contract payments to the Contractor and/or any Subcontractor if:

- a. The required prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations is not paid to all workers employed on the Project; or



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- b. The Contractor or Subcontractor(s) fail to submit all required certified payroll records with each application for payment, but not less than once per month; or
- c. The Contractor or Subcontractor(s) submit incomplete or inadequate payroll records; or
- d. The Contractor or Subcontractor(s) fail to comply with the Labor Code requirements concerning apprentices; or
- e. The Contractor or Subcontractor(s) fail to comply with any applicable state laws governing workers on public works projects.

### **13.9 APPRENTICES**

#### 13.9.1 Apprentice Wages and Definitions

All apprentices employed by the Contractor to perform services under the Contract shall be paid the standard wage paid to apprentices under the regulations of the craft or trade for which he or she is employed, and as determined by the Director of the Department of Industrial Relations, and shall be employed only at the craft or trade to which he or she is registered. Only apprentices, as defined in §3077 of the Labor Code, 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 apprenticeship agreements under Chapter 4 (commencing with §3070) of Division 3, are eligible to be employed under this Contract. The employment and training of each apprentice shall be in accordance with the apprenticeship standards and apprentice agreements under which he or she is training, or in accordance with the rules and regulations of the California Apprenticeship Council.

#### 13.9.2 Employment of Apprentices

Contractor agrees to comply with the requirements of Labor Code §1777.5. The Contractor awarded the Project, or any Subcontractor under him or her, when performing any of the Work under the Contract or subcontract, employs workers in any apprenticeable craft or trade, the Contractor and Subcontractor shall employ apprentices in the ratio set forth in Labor Code §1777.5. The Contractor or any Subcontractor must apply to any apprenticeship program in the craft or trade that can provide apprentices to the Project site for a certificate approving the contractor or subcontractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected. However, the decision of the apprenticeship program to approve or deny a certificate shall be subject to review by the Administrator of Apprenticeship. The apprenticeship program or programs, upon approving the Contractor or Subcontractor, shall arrange for the dispatch of apprentices to the Contractor or Subcontractor upon the Contractor's or Subcontractor's request. "Apprenticeable craft or trade" as used in this Article means a craft or trade determined as an apprenticeable occupation in accordance with the rules and regulations prescribed by the California Apprenticeship Council. The ratio of work performed by apprentices to journeyman employed in a particular craft or trade on the Project shall be in accordance with Labor Code §1777.5.

#### 13.9.3 Submission of Contract Information

Prior to commencing Work on the Project, the Contractor and Subcontractors shall submit contract award information to the applicable apprenticeship program(s) that can supply apprentices to the Project and make the request for the dispatch of apprentices in accordance with the Labor Code. The

## **GENERAL CONDITIONS**

information submitted shall include an estimate of journeyman hours to be performed under the Contract, 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 the County if requested. Within 60 days after concluding Work on the Project, the Contractor and Subcontractors shall submit to the County, if requested, and to the apprenticeship program a verified statement of the journeyman and apprentice hours performed on the Project.

### 13.9.4 Apprentice Fund

The Contractor or any Subcontractor under him or her, who, in performing any of the Work under the Contract, employs journeymen or apprentices in any apprenticeable craft or trade shall contribute to the California Apprenticeship Council the same amount that the Director determines is the prevailing amount of apprenticeship training contributions in the area of the Project. The Contractor and Subcontractors may take as a credit for payments to the California Apprenticeship Council any amounts paid by the Contractor or Subcontractor to an approved apprenticeship program that can supply apprentices to the Project. The Contractor and Subcontractors may add the amount of the contributions in computing his or her bid for the Contract.

### 13.9.5 Prime Contractor Compliance

The responsibility of compliance with Article 13 and §1777.5 of the Labor Code for all apprenticeable occupations is with the Prime Contractor. Any Contractor or Subcontractor that knowingly violates the provisions of this Article or Labor Code §1777.5 shall be subject to the penalties set forth in Labor Code §1777.7.

## **13.10 ASSIGNMENT OF ANTITRUST CLAIMS**

### 13.10.1 Application

Pursuant to Government Code § 4551, 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 County all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act, (15 U.S.C. § 15) or under the Cartwright Act (Chapter 2 [commencing with § 16700] of Part 2 of Division 7 of the Business and Professions Code), arising from the purchase of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders Retention Payment to the Contractor, without further acknowledgment by the parties. If the County receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under Chapter 11 (commencing with § 4550) of Division 5 of Title 1 of the Government Code, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the County any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the County as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

### 13.10.2 Assignment of Claim

Upon demand in writing by the assignor, the County shall, within one (1) year from such demand, reassign the cause of action assigned pursuant to this Article if the assignor has been or may have been injured by the violation of law for which the cause of action arose and the County has not been injured thereby or the County declines to file a court action for the cause of action.

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### **13.11 STATE AND COUNTY CONDUCTED AUDITS**

Pursuant to and in accordance with the provisions of Government Code § 10532, or any amendments thereto, all books, records, and files of the County, the Contractor, or any Subcontractor connected with the performance of this Contract involving the expenditure of state funds in excess of Ten Thousand Dollars (\$10,000.00), including, but not limited to, the administration thereof, shall be subject to the examination and audit of the Office of the Auditor General of the State of California for a period of five (5) years after Retention Payment is made or a Notice of Completion is Recorded, whichever occurs first. Contractor shall preserve and cause to be preserved such books, records, hard drives, electronic media, and files for the audit period.

Pursuant to the remedies under Public Contract Code section 9201 and Government Code section 930.2, Contractor, through execution of this Agreement, also agrees the County shall have the right to review and audit, upon reasonable notice, the books and records of the Contractor concerning any monies associated with the Project. The purpose of this “Audit” is to quickly and efficiently resolve Disputes or Claims based on the actual costs incurred and to reduce the uncertainty in resolving Disputes or Claims with limited information. The County shall perform any audits at its own cost and any such audit shall be performed by an independent auditor, having no direct or indirect relationship with the functions or activities being audited or with the business conducted by the Contractor or County. In the event the independent auditor determines that Change Orders, response to Request for Proposals, Disputes, Claims, or other requests for payment are in error, or have has any other concerns or questions, the Auditor shall report the results of the Audit findings to the County and provide a copy to the Contractor after giving the Superintendent the opportunity for at least 10 days review. If the Contractor disputes the findings of the independent auditor, such dispute shall be handled in the manner set forth under Article 4.6.2.

If Contractor having agreed to the terms of this Contract fails to produce books or records requested by Auditor, such failure to produce books or records that were required to be preserved for audit, it shall be presumed that the information contained in the withheld books or records were unfavorable to the Contractor and the Auditor shall note this refusal in the results of the Audit findings for further evaluation by the County and the Superintendent. The refusal to release records that are concerning monies associated with the Project may be used as a grounds to debar the Contractor under Article 15 for failure to preserve records under Article 13.11 and the failure to produce required audit records may also be used as a grounds for a negative finding against the Contractor depending on the significance of the records that are withheld by Contractor. Failure to produce job cost data tied to job cost categories and budgets shall be presumed an intentional failure to produce key audit records. Similarly, failure to produce Daily Reports (prepared at or near the time of the Work actually took place (See Article 3.16) shall be presumed an intentional failure to produce key audited records.

If Contractor is seeking costs for inefficiency, home office overhead, or unanticipated increased costs due to delays or acceleration, Contractor shall also produce copies of the original bid tabulation utilized in submitting Contractor’s bid for the Project. This document shall be considered confidential and shall not be subject to disclosure through a Public Records Act and shall not be distributed to anyone other than the County and the County’s counsel. This bid tabulation shall only be used in litigation, arbitration, evaluation of Claims or Disputes, Audit, and trial. If the records for the bid tabulation are kept on a computer, the Contractor shall also produce all metadata (in native format) that accompanies the bid tabulation for inspection to prove the authenticity of the underlying bid tabulation. Failure to produce the bid tabulation for review of inefficiency, home office overhead, or unanticipated increased costs due to delays or accelerations shall be considered material evidence that the bid tabulation was not favorable to the Contractor. This evidence shall be entered as a jury instruction for trial that the bid

## **GENERAL CONDITIONS**

tabulation was not produced and the bid tabulation information was unfavorable to the Contractor. The evidence may also be used in debarment proceedings, and noted as an exception to an Audit findings.

Upon notification of Contractor concerning the results of the audit and a reasonable time has passed for Contractor to respond to the Audit findings and if either there is no Dispute of the Audit findings under Article 4.6 or if the result after utilizing the Disputes Clause confirms the Audit findings, the County may seek reimbursement for overstated Disputes, Claims, or Change Orders and may also undertake debarment proceedings under Article 15 of these General Conditions.

### **13.12 STORM WATER POLLUTION PREVENTION**

#### **13.12.1 Application**

This Section addresses the preparation, implementation and monitoring of a Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharge of pollutants from the construction site. This includes the elimination of pollution discharges such as improper dumping, spills or leakage from storage tanks or transfer areas. The County will not issue a Notice to Proceed until Contractor has prepared by a qualified individual and obtained approval of the Permit Registration Documents (“PRDs”) that include a Notice of Intent, Construction Risk Calculation, Site Map, SWPPP, Annual Fee and any additional required documents from all applicable Local Governing Agencies including the Regional Water Quality Control Board. The Contractor shall also secure a certification that the Project has met all of the conditions of the General Construction Activity Storm Water Permit (GCASP) and comply with all applicable local, state and federal regulations governing storm water pollution prevention.

#### **13.12.2 References and Materials**

- California Stormwater Quality Association New Development and Redevelopment Best Management Practice Handbook
- 2009 California Stormwater Quality Association Construction BMP Handbook .
- State Water Resources Control Board (2009). Order 2009-0009-DWQ, NPDES General Permit No. CAS000002: Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbing Activities. Available on-line at:
- [http://www.waterboards.ca.gov/water\\_issues/programs/stormwater/construction.shtml](http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml).- Use materials of a class, grade and type needed to meet the performance described in the BMP Handbook.

#### **13.12.3 Preparation and Approval**

The Contractor shall prepare by a qualified individual the PRDs that include a Notice of Intent, Construction Risk Calculation, Site Map, SWPPP, Annual Fee and any additional required documents. The Contractor’s Qualified SWPPP Developer (“QSD”) shall prepare the Storm Water Pollution Prevention Plan (SWPPP) as required to comply with storm water pollution regulations for project sites with storm water discharges associated with construction activity such as clearing or demolition, grading, excavation and other land disturbances. The SWPPP shall apply to all areas that are directly related to construction activity, including but not limited to staging areas, storage yards, material borrow areas, and access roads.

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13.12.3.1 The Contractor shall prepare and submit to the Local Governing Agencies and the County the SWPPP for review and approval if the project sites, new or existing, with land disturbance of 1 or more acres (or less than 1 acres if part of a common plan of development); the construction activity that results in land surface disturbances of less than one acre is part of a larger common plan of development or sale of one or more acres of disturbed land surface; or the construction activity associated with Linear Underground/Overhead Projects ("LUPs") including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

13.12.3.2 The Contractor shall also pay annual renewal fee(s) until the contract is completed and make all such checks payable to the State Water Resources Control Board. The Notice of Intent must be submitted at least two weeks prior to the commencement of construction activities.

13.12.3.3 The Contractor shall prepare the SWPPP by following the format in Sections 2, 3, 4 and Appendices A through F of the California Stormwater BMP Handbook - Construction, January 2009 edition, published by the California Stormwater Quality Association. The publication is available from:

California Stormwater  
Quality Association  
P.O. Box 2105  
Menlo Park, CA 94026-2105  
Phone: (650) 366-1042  
E-mail: [info@casqa.org](mailto:info@casqa.org)

or

<https://www.casqa.org/store/products/tabid/154/p-167-construction-handbookportal-initial-subscription.aspx>

13.12.3.4 Where land disturbance is less than 1 acre, any BMPs indicated in the BMP Handbook needed to prevent or minimize storm water pollution shall be implemented at no extra cost to the County.

13.12.3.5 Within two weeks after Award of Contract by the County, the Contractor shall submit to the County's Civil Engineer one copy of the PRDs including the SWPPP for review. After the County's approval, the Contractor shall provide approved copies of the SWPPP as follows: one copy each to the Project Inspector, Construction Manager, Architect, Commissioned Architect and County's Civil Engineer.

### 13.12.4 Implementation

The Contractor shall implement the Storm Water Pollution Prevention Plan by doing the following:

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- a. Obtain a Waste Discharger Identification (WDID) number from the SWRCB before beginning construction. This number will be issued once your PRDs are administratively accepted and fee is received.
- b. Keep the SWPPP, REAPs, monitoring data on the construction site.
- c. Employ a Qualified SWPPP Practitioner (QSP) to implement the SWPPP during construction and develop Rain Event Action Plans ("REAPs").
- d. Install, inspect, maintain and monitor BMPs required by the General Permit.
- e. Install perimeter controls prior to starting other construction work at the site.
- f. Contain on-site storm water at the jobsite. Do not drain on-site water directly into the storm drain.
- g. Implement the SWPPP.
- h. Provide SWPPP and BMP implementation training for those responsible for implementing the SWPPP.
- i. Designate trained personnel for the proper implementation of the SWPPP.
- j. Conduct monitoring, as required, and assess compliance with the Numeric Action Levels (NALs) or Numeric Effluent Limitations (NELs) appropriate to your project.
- k. Report monitoring data:
  1. Maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed.
  2. Have a QSD revise the SWPPP as needed to reflect the phases of construction and to suit changing site conditions and instances when properly installed systems are ineffective.
  3. Assist the County with entering any necessary data or information into the Stormwater Multi-Application and Reporting System ("SMARTS") system.
- l. At the end of Construction Contract:
  1. Submit Notice of Termination (NOT) into the SMARTS when construction is complete and conditions of termination listed in the NOT have been satisfied. A copy of the NOT can be found at: [http://www.waterboards.ca.gov/water\\_issues/programs/stormwater/const\\_ruction.shtml](http://www.waterboards.ca.gov/water_issues/programs/stormwater/const_ruction.shtml).

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2. Leave in place storm water pollution prevention controls needed for post-construction storm water management and remove those that are not needed as determined by the County. Thereafter, left-in-place controls will be maintained by the County.
3. Provide Site Monitoring Reports, SWPPP revisions, Compliance Certifications and related documents to the County. Post-construction storm water operation and management plan as mentioned in the compliance certifications are considered to be in place at the end of the Construction Contract.

### 13.12.5 Monitoring

The Contractor shall conduct examination of storm water pollution prevention controls as required by the State Water Resources Control Board (2009). Order 2009-0009-DWQ, NPDES General Permit No. CAS000002: Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbing Activities. This includes properly qualified personnel performing all required monitoring, testing, inspections and monitoring. The Contractor shall also conduct examination of storm water pollution prevention controls, as well as before and after each storm event in compliance with the State Water Resources Control Board Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System General Permit No. CAS000002, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities (General Permit) (SWRCB, 2009).and at least once each 24-hour period during extended storm events to identify BMP effectiveness and implement repairs or BMP changes as soon as feasible. All maintenance related to a storm event should be completed within 48 hours of the storm event. The Contactor shall also prepare and maintain, at the jobsite, a log of each inspection using Site Monitoring Report forms.

### 13.12.6 Liabilities and Penalties

- a. Review of the SWPPP and inspection logs by the County shall not relieve the Contractor from liabilities arising from non-compliance with storm water pollution regulations.
- b. Payment of penalties for non-compliance by the Contractor shall be the sole responsibility of the Contractor and will not be reimbursed by the County.
- c. Compliance with the Clean Water Act pertaining to construction activity is the sole responsibility of the Contractor. For any fine(s) levied against the County due to non-compliance by the Contractor, the County will deduct from the final payment due the Contractor the total amount of the fine(s) levied on the County, plus legal and associated costs.
- d. The Contractor shall submit to the County a completed NOI for change of information (Construction Site Information and Material Handling/Management Practices).

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### **ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT**

#### **14.1 TERMINATION BY THE CONTRACTOR FOR CAUSE**

##### **14.1.1 Grounds for Termination**

The Contractor may terminate the Contract if the Work is stopped for a period of thirty (30) consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons performing portions of the Work for whom the Contractor is contractually responsible, for only the following reasons:

- a. Issuance of an order of a court or other public authority having jurisdiction; or
- b. An act of the United State or California government, such as a declaration of national emergency.

##### **14.1.2 Notice of Termination**

If one of the above reasons exists, the Contractor may, upon written notice of seven (7) additional days to the County, terminate the Contract and recover from the County payment for Work executed and for reasonable costs verified by the Architect with respect to materials, equipment, tools, construction equipment, and machinery, including reasonable overhead, profit, and damages.

#### **14.2 TERMINATION BY THE COUNTY FOR CAUSE**

##### **14.2.1 Grounds for Termination**

The County may terminate the Contractor and/or this Contract for the following reasons:

- a. Persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- b. Persistently or repeatedly is absent, without excuse, from the job site;
- c. Fails to make payment to Subcontractors, suppliers, materialmen, etc.;
- d. Persistently disregards laws, ordinances, rules, regulations, or orders of a public authority having jurisdiction;
- e. Fails to provide a schedule or fails or refuses to update schedules required under the Contract;
- f. Falls behind on the Project and refuses or fails to undertake a Recovery Schedule;
- g. If the Contractor has been debarred from performing Work
- h. Becomes bankrupt or insolvent, including the filing of a general assignment for the benefit of creditors; or



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- i. Otherwise is in substantial breach of a provision of the Contract Documents.

### 14.2.2 Notification of Termination

When any of the above reasons exist, the County may, without prejudice to any other rights or remedies of the County and after giving the Contractor and the Contractor's Surety written notice of seven (7) days, terminate the Contractor and/or this Contract and may, subject to any prior rights of the Surety:

- a. Take possession of the Project and of all material, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- b. Accept assignment of Subcontracts. Contractor acknowledges and agrees that if the County (in its sole and absolute discretion) decides to takeover completion of the Project, the Contractor agrees to immediately assign all subcontracts to the County which the County has chosen to accept;
- c. Complete the Work by any reasonable method the County may deem expedient, including contracting with a replacement contractor or contractors; and,
- d. Agree to accept a takeover and completion arrangement with Surety that is acceptable to the Superintendent.

### 14.2.3 Takeover and Completion of Work after Termination for Cause

A Termination for Cause is an urgent matter which requires immediate remediation since Project Work is open and incomplete, the site is subject to vandalism and theft, the Project site is considered a public nuisance, and there is a possibility of injury and deterioration of the Project Work and materials. Thus, the County shall be entitled to enter a takeover contract to either remediate the unfinished condition or complete the Work for this Project.

### 14.2.4 Payments Withheld

If the County terminates the Contract for one of the reasons stated in Article 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is complete. All costs associated with the termination and completion of the Project shall be the responsibility of the Contractor and/or its Surety.

### 14.2.5 Payments upon Completion

If the unpaid balance of the Contract Sum exceeds costs of completing the Work, including compensation for professional services and expenses made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor and its Surety shall pay the difference to the County. The amount to be paid to the Contractor, or County, as the case may be, shall be certified by the Architect upon application. This payment obligation shall survive completion of the Contract.

## **14.3 TERMINATION OF CONTRACT BY COUNTY (CONTRACTOR NOT AT FAULT)**

### 14.3.1 Termination for Convenience

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County may terminate the Contract upon fifteen (15) calendar days of written notice to the Contractor and use any reasonable method the County deems expedient to complete the Project, including contracting with replacement contractor or contractors, if it is found that reasons beyond the control of either the County or Contractor make it impossible or against the County's interest to complete the Project. In such a case, the Contractor shall have no Claims against the County except for: (1) the actual cost for approved labor, materials, and services performed in accordance with the Contract Documents which have not otherwise been previously paid for and which are supported and documented through timesheets, invoices, receipts, or otherwise; and (2) profit and overhead of ten percent (10%) of the approved costs in item (1); and (3) termination cost of five percent (5%) of the approved costs in item (1). Contractor acknowledges and agrees that if the County (in its sole and absolute discretion) decides to takeover completion of the Project, the Contractor agrees to immediately assign all subcontracts to the County which the County has chosen to accept.

### **14.3.2 Non-Appropriation of Funds/ Insufficient Funds**

In the event that sufficient funds are not appropriated to complete the Project or the County determines that sufficient funds are not available to complete the Project, County may terminate or suspend the completion of the Project at any time by giving written notice to the Contractor. In the event that the County exercises this option, the County shall pay for any and all work and materials completed or delivered onto the site for which value is received, and the value of any and all work then in progress and orders actually placed which cannot be canceled up to the date of notice of termination. The value of work and materials not otherwise already paid for by the County up to the time of termination under this Paragraph shall include a factor of fifteen percent (15%) for the Contractor's overhead and profit and there shall be no other costs or expenses paid to Contractor. All work, materials and orders paid for pursuant to this provision shall become the property of the County. County may, without cause, order Contractor in writing to suspend, delay or interrupt the Project in whole or in part for such period of time as County may determine. Adjustment shall be made for increases in the cost of performance of the Agreement caused by suspense, delay or interruption.

## **14.4 REMEDIES OTHER THAN TERMINATION**

If a default occurs, the County may, without prejudice to any other right or remedy, including, without limitation, its right to terminate the Contract pursuant to Article 14.2, do any of the following:

- a. Permit the Contractor to continue under this Contract, but make good such deficiencies or complete the Contract by whatever method the County may deem expedient, and the cost and expense thereof shall be deducted from the Contract Price or paid by the Contractor to the County on demand;
- b. If the workmanship performed by the Contractor is faulty or defective materials are provided, erected or installed, then the County may order the Contractor to remove the faulty workmanship or defective materials and to replace the same with work or materials that conform to the Contract Documents, in which event the Contractor, at its sole costs and expense, shall proceed in accordance with the County's order and complete the same within the time period given by the County in its notice to the Contractor; or
- c. Initiate procedures to declare the Contractor a non-responsible bidder for a period of two (2) to five (5) years thereafter.

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All amounts expended by the County in connection with the exercise of its rights hereunder shall accrue interest from the date expended until paid to the County at the maximum legal rate. The County may retain or withhold any such amounts from the Contract Price. If the Contractor is ordered to replace any faulty workmanship or defective materials pursuant to Paragraph (b) above, the Contractor shall replace the same with new work or materials approved by the Architect and the County, and, at its own cost, shall repair or replace, in a manner and to the extent the Architect and the County shall direct, all Work or material that is damaged, injured or destroyed by the removal of said faulty workmanship or defective material, or by the replacement of the same with acceptable work or materials. In no event shall anything in this Article be deemed to constitute a waiver by the County of any other rights or remedies that it may have at law or in equity, it being acknowledged and agreed by the Contractor that the remedies set forth in this Article are in addition to, and not in lieu of, any other rights or remedies that the County may have at law or in equity.

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### **ARTICLE 15 DEBARMENT**

#### **15.1 DEBARMENT MEANS THERE HAS BEEN A FINDING THAT THE CONTRACTOR IS NOT RESPONSIBLE.**

During the course of the Project, or if it is determined through Change Orders, Claims, or Audit that a Contractor is not responsible, the County may, in addition to other remedies provided in the Contract, debar the Contractor from bidding or proposing on, or being awarded, and/or performing work on County contracts for a specified period of time, which generally will not exceed five (5) years, but may exceed five (5) years or be permanent if the circumstances warrant such debarment. In addition to the debarment proceeding, a finding that a Contractor is to be debarred shall result in the termination of any or all existing Contracts the Contractor may have with the County.

#### **15.2 SUPERINTENDENT FINDING**

The County may debar a Contractor if the Superintendent, or the Superintendent's delegatee, in its discretion, finds the Contractor has done any of the following:

15.2.1 Intentionally or with reckless disregard, violated any term of the Contract with the County

15.2.2 Committed an acts or omission which reflects on the Contractor's quality, fitness or capacity to perform Work for the County;

15.2.3 Committed an act or offense which indicates a lack of business integrity or business honesty; or,

15.2.4 Made or submitted a false claim against the County or any other public entity.

#### **15.3 HEARING AND PRESENTATION OF EVIDENCE**

If there is evidence that the Contractor may be subject to debarment, the County shall notify the Contractor in writing of the evidence which is the basis for the proposed debarment and shall advise the Contractor of the scheduled date for a debarment hearing before the Superintendent or its delegated designee.

The Superintendent, or designee, shall conduct a hearing where evidence on the proposed debarment is presented. The Contractor or the Contractor's representative shall be given an opportunity to submit evidence at the hearing. The Contractor shall be provided an adequate amount of time to prepare and object to evidence presented. A tentative proposed decision shall be issued as a tentative decision and the County shall be entitled to modify, deny or adopt the proposed decision. The proposed decision shall contain a recommendation regarding whether the Contractor should be debarred, and, if so, the appropriate length of time of the debarment. The Contractor and the County shall be provided an opportunity to object to the tentative proposed decision for a period of 15 days. If additional evidence is presented, the County shall evaluate this evidence and either issue an amended ruling, issue the same ruling, or call a further hearing.

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If a Contractor has been debarred for a period of longer than five (5) years, that Contractor may after the debarment has been in effect for at least five (5) years, submit a written request for review of the debarment determination to reduce the period of debarment or terminate the debarment. The County may, in its discretion, reduce the period of debarment or terminate the debarment if it finds that the Contractor has adequately demonstrated one or more of the following: (1) elimination of the grounds for which the debarment was imposed; (2) a bona fide change in ownership or management; (3) material evidence discovered after debarment was imposed; or (4) any other reason that is in the best interests of the County.

The County will consider a request for review of a debarment determination only where: (1) the Contractor has been debarred for a period longer than five (5) years; (2) the debarment has been in effect for at least five (5) years; and (3) the request is in writing, states one or more of the grounds for reduction of the debarment period or termination of the debarment, and includes supporting documentation. Upon receiving an appropriate request, the County will provide notice of the hearing on the request. At the hearing, the County shall review evidence on the proposed reduction of debarment period. This hearing shall be conducted and the request for review decided by the County pursuant to the same procedures as for a debarment hearing.

The County's proposed decision shall contain a recommendation on the request to reduce the period of debarment or terminate the debarment.

The terms shall also apply to Subcontractors of Contractor.

## SUPPLEMENTARY GENERAL CONDITIONS

The following supplements modify the General Conditions. Where a portion of the General Conditions is modified and or deleted by these Supplementary General Conditions, the unaltered portions of the General Conditions shall remain in effect.

### SCOPE OF WORK

- Refer to Divisions 02 through 33 – Technical Requirements and drawings for Scope of Work.
- Bidder shall carefully review the total scope of responsibilities with respect to the Work of the Bid Package and shall provide for the total scope in its Formal Bid. Bidder is responsible to confirm all makes, model numbers, options and applicable part numbers.
- Scope of work includes but is not limited to:
  - Demolition of west wall and all interiors, including floors, walls, and stairs of an existing three-story brick building. Expanding new construction attached to west side of building, and deepening basement level.
  - New interior configuration to include 3 stories plus basement; 1 elevator and 2 interior exit stairways.
  - The existing structural system will be replaced with a modern structural steel frame designed to support the anticipated building loads and to resist lateral wind and earthquake forces. The existing exterior unreinforced masonry walls will be tied back into the new structural steel frame.
  - The basement level will be occupied and used for utility services, personnel and storage. the ground floor will house the main reception area and four classrooms. the second floor will house the Codestack Academy’s customer support center. the third floor will house the administration and code writing spaces.
  - The building will be heated and cooled by roof top mounted HVAC units. the adjacent parcel, 206 N Sutter Street will be developed into a parking lot for the Codestack academy.
- Hazmat Abatement Scope of Work: All hazmat abatement work will be done under a separate contract by others, and is not part of the scope of work in this contract. Completion date for the hazmat abatement work is 12/31/24.

### ARTICLE 3 – THE CONTRACTOR

- Article 3.10.4 Add the following: The Contractor shall require all Subcontractors to prepare and submit to the Contractor, within *fifteen (15)* days of execution of the Subcontract, comprehensive lists, in quadruplicate, of the manufacturers and products proposed for the Project, including information on materials, equipment, and fixtures required by the Contract Documents, as may be required for the Contractor’s or Architect’s approval.

## SUPPLEMENTARY GENERAL CONDITIONS

### ARTICLE 8 - TIME

Contractor shall perform and reach Substantial Completion (See Article 1.1.44) within the time specified in the Agreement Form. Article 8 Schedule Inclusion Requirements –The Contractor’s Baseline Schedule shall include the following Milestone Schedule:

The Schedule the Work to accommodate the following milestone requirements:

- Post Bid Document Phase – Milestone #1 (Start Date: Not Later than December 15, 2024)
  - Notice of Intent to Award
  - District Approval
  - Post-Bid Contract Submittals
- Post Bid Document Phase – Milestone #1 (Completion Date: Not Later than January 7, 2025)
  
- Procurement/Mobilization Phase – Milestone #2 (Start Date: Not Later than January 8, 2025)
  - Notice to Proceed
  - Critical Path Project Submittals/Shop Drawings
  - Submission of all remaining required submittals in accordance with General Conditions, Article 3.7.
  - Begin procurement of long lead/critical path materials
  - Mobilization/initial layout
- Procurement/Mobilization Phase – Milestone #2 (Completion Date: Not Later than January 14, 2025)
  
- Construction Work Phase – Sitework - Milestone #3 (Start Date: January 15, 2024)
  - All related scope of work.
- Construction Work Phase – Sitework - Milestone #3 (Completion Date: Not Later than October 31, 2025)
  
- Construction Work Phase –Building - Milestone #4 (Start Date: January 15, 2025)
  - All related scope of work.
- Construction Work Phase –Building - Milestone #4
  - (Completion Date of Basement: Not Later than November 28, 2025)
  - (Completion Date of Third Floor: Not Later than December 12, 2025)
  - (Completion Date of Second Floor: Not Later than January 9, 2026)
  - (Completion Date of First Floor: Not Later than January 23, 2026)
  - (Completion Date – Substantial Completion / Temporary Certificate of Occupancy (TCO): Not Later than January 30, 2026)
  
- Final Contract Close-Out Phase – Milestone #5 (Start Date: Not Later than January 31, 2026)
  - Final Contract Close-Out Procedures, in accordance with General Conditions, Article 9.9.
- Final Contract Close-Out Phase – Milestone #5 (Completion Date: Not Later than February 28, 2026)

4. **ARTICLE 8.4.1 - LIQUIDATED DAMAGES** – Contractor will be liable to District for liquidated damages pursuant to Article 8.4 for each calendar day of delay in the amount set forth in the Agreement Form.

**SUPPLEMENTARY GENERAL CONDITIONS**

5. **ARTICLE 11.10 - PERFORMANCE AND PAYMENT BONDS** – The number of executed copies of the Performance Bond and the Payment Bond required is three (3).

Division 1 Forms

**IMMEDIATE CONSTRUCTION CHANGE DIRECTIVE NO.**

PROJECT: CodeStack Academy – 201 N. California St.

TO: \_\_\_\_\_

You are hereby directed to provide the extra work necessary to comply with this ICD.

DESCRIPTION OF CHANGE: \_\_\_\_\_

\_\_\_\_\_

COST (This cost shall not be exceeded): \_\_\_\_\_

TIME FOR COMPLETION: \_\_\_\_\_

NOTE:

Pursuant to Article 7.3.1.2 An Immediate Change Directive is a written order to the Contractor prepared by the Architect and signed by the County (and CM if there is a CM on the Project) and the Architect, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The County may by ICD, without invalidating the Contract, direct immediate changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions within. If applicable, the Contract Sum and Contract Time will be adjusted accordingly. **CONTRACTOR SHALL PROCEED WITH WORK SET FORTH IN THIS ICD IMMEDIATELY UPON RECEIPT OR THE COUNTY MAY EITHER HOLD THE CONTRACTOR IN EITHER PARTIAL DEFAULT PURSUANT TO ARTICLE 2.2 OR TOTAL DEFAULT PURSUANT TO ARTICLE 14.**

\_\_\_\_\_  
Architect

\_\_\_\_\_  
County



**SUPPLEMENTARY GENERAL CONDITIONS**

**CERTIFICATE OF SUBSTANTIAL COMPLETION**

PROJECT: CodeStack Academy – 201 N. California St.

TO: \_\_\_\_\_

As the Architect for the Project described above, the Project has reached Substantial Completion. Substantial Completion is not reached unless and until each of the following three (3) conditions have been met: (1) all contractually required items have been installed with the exception of only minor and Incomplete Punch Items (See Article 9.9 of the General Conditions); (2) All Fire/Life Safety Systems have been installed, and are working, all building systems including mechanical, electrical and plumbing are all functioning; and (3) the Project is fit for occupancy and its intended use.

I certify that the Project has reached Substantial Completion as defined above on the following date:  
\_\_\_\_\_.

\_\_\_\_\_  
Architect

**DOCUMENT 00 31 32 - GEOTECHNICAL DATA**

**1. Summary**

This document describes geotechnical data at or near the Project that is in the District's possession available for Contractor's review, and use of data resulting from various investigations. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

**2. Geotechnical Report**

- a. A geotechnical report has been prepared for and around the Site and/or in connection with the Work by soil investigation engineers hired by San Joaquin County Office of Education's ("District") consultants.
- b. The geotechnical report is included as a reference document with the bid documents. The report is **not** part of the Contract Documents.
- c. The report and drawings of physical conditions that may relate to the Project is the following:

**"Geotechnical Engineering Report, Project Name, SJCOE Code Stack Academy – 201 N. California Street, Stockton, California", prepared by: Mid Pacific Engineering, Inc., Project No. MPE No. 06357-01, Dated: April 18, 2024.**

**3. Use of Data**

- a. Geotechnical data were obtained only for use of District and its consultants, contractors, and tenants for planning and design and are **not** a part of Contract Documents.
- b. Except as expressly set forth below, District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any geotechnical data. Bidder represents and agrees that in submitting a Bid it is not relying on any geotechnical data supplied by District, except as specifically allowed below.
- c. Under no circumstances shall District be deemed to make a warranty or representation of existing above ground conditions, as-built conditions, geotechnical conditions, or other actual conditions verifiable by independent investigation. These conditions are verifiable by Contractor by the performance of its own independent investigation that Contractor should perform as a condition to bidding and Contractor must not and shall not rely on information supplied by District.

**4. Limited Reliance Permitted on Certain Information**

- a. Reference is made herein for identification of:

Reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by District in preparation of the Contract Documents.

Drawings of physical conditions in or relating to existing subsurface structures (except underground facilities) that are at or contiguous to the Site and have been utilized by District in preparation of the Contract Documents.

- b. Bidder may rely upon the general accuracy of the “technical data” contained in the reports and drawings identified above, but only insofar as it relates to subsurface conditions, provided Bidder has conducted the independent investigation required pursuant to Instructions to Bidders, and discrepancies are not apparent. The term “technical data” in the referenced reports and drawings shall be limited as follows:
  - (1) The term “technical data” shall include actual reported depths, reported quantities, reported soil types, reported soil conditions, and reported material, equipment or structures that were encountered during subsurface exploration. The term “technical data” does not include, and Bidder may not rely upon, any other data, interpretations, opinions or information shown or indicated in such drawings or reports that otherwise relate to subsurface conditions or described structures.
  - (2) The term “technical data” shall not include the location of underground facilities.
  - (3) Bidder may not rely on the completeness of reports and drawings for the purposes of bidding or construction. Bidder may rely upon the general accuracy of the “technical data” contained in such reports or drawings.
  - (4) Bidder is solely responsible for any interpretation or conclusion drawn from any “technical data” or any other data, interpretations, opinions, or information provided in the identified reports and drawings.

**5. Investigations/Site Examinations**

- a. Before submitting a Bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.
- b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a Bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District’s prior approval.

**END OF DOCUMENT**

**SECTION 01 11 00 - SUMMARY OF WORK**

1. GENERAL

A. RELATED DOCUMENTS AND PROVISIONS

Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Documents, apply to this Document.

B. SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

- Refer to Divisions 02 through 33 – Technical Requirements and drawings for Scope of Work.
- Bidder shall carefully review the total scope of responsibilities with respect to the Work of the Bid Package and shall provide for the total scope in its Formal Bid. Bidder is responsible to confirm all makes, model numbers, options and applicable part numbers.
- Scope of work includes but is not limited to:
  - Demolition of west wall and all interiors, including floors, walls, and stairs of an existing three-story brick building. Expanding new construction attached to west side of building, and deepening basement level.
  - New interior configuration to include 3 stories plus basement; 1 elevator and 2 interior exit stairways.
  - The existing structural system will be replaced with a modern structural steel frame designed to support the anticipated building loads and to resist lateral wind and earthquake forces. The existing exterior unreinforced masonry walls will be tied back into the new structural steel frame.
  - The basement level will be occupied and used for utility services, personnel and storage. the ground floor will house the main reception area and four classrooms. the second floor will house the Codestack Academy's customer support center. the third floor will house the administration and code writing spaces.
  - The building will be heated and cooled by roof top mounted HVAC units. the adjacent parcel, 206 N Sutter Street will be developed into a parking lot for the Codestack academy.

C. CONTRACTS

1. Perform the Work under conventional bid-build contract.

D. WORK BY OTHERS

1. Work on the Project that will be performed and completed prior to the start of the Work of this Contract:
  - a. Hazmat Abatement Scope of Work: All hazmat abatement work will be done under a separate contract by others, and is not part of the scope of work in this contract. Completion date for the hazmat abatement work is 12/31/24.

E. CODES, REGULATIONS AND STANDARDS

1. The codes, regulations, and standards adopted by the State and federal agencies having jurisdiction shall govern minimum requirements for the Project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.
2. Codes, regulations, and standards are as published effective as of date of bid opening, unless otherwise specified or indicated.

**F. EXAMINATION OF EXISTING CONDITIONS**

1. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site and of the streets and roads approaching the Site.
2. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.
3. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

**G. CONTRACTOR'S USE OF PREMISES**

1. Contractor shall take all reasonable precautions for the safety of the students and the school employees throughout the duration of the Project.
2. If unoccupied and only with District's prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.
3. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor, at no expense to District.
4. Contractor shall not interfere with others use of or access to occupied portions of the building(s) or adjacent property.
5. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.
6. No one other than those directly involved in the demolition and construction or specifically designated by the District or the Architect shall be permitted in the areas of Work during demolition and construction activities.

**H. PROTECTION OF EXISTING STRUCTURES AND UTILITIES**

1. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.
2. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

**I. STRUCTURAL INTEGRITY**

1. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.
2. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

**END OF DOCUMENT**

**SECTION 01 23 00 - CASH ALLOWANCES**

PART 1 GENERAL

1.01 SUMMARY

- A. To provide a budget to cover scope of work not precisely determined by the Contract Documents prior to bidding, allow within the proposed Contract Sum the amounts described in this Section.
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, Bidding and Contract Requirements, General Requirements and related Technical Requirements.
  - 2. Other provisions concerning Cash Allowances are stated in General Conditions.
  - 3. Other provisions concerning Cash Allowances also may be stated in other Sections of the Project Manual.

1.02 SPECIFIC CASH ALLOWANCES

BID PACKAGE #010-233-233000 CodeStack Academy – 201 N. California St.

- A. Allowance #1: District to provide within the final Contract Price the amount of **\$300,000** for unforeseen conditions to be used at the Owner's discretion. This allowance will be expended under a "time and material" basis using current prevailing wage rates, as directed by the Architect and Owner's Representative. All unused portions of the allowance will be deducted from the contract through a change order.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

**SECTION 01 25 00 - SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**1.02 RELATED REQUIREMENTS**

- A. Instructions to Bidders: Restrictions on timing of substitution requests.
- B. Request for Substitution at Time of Bid Form: Required form for substitution requests made prior to award of contract (During procurement).
- C. General Conditions, Part 3.10 – Substitutions.
- D. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.
- E. Section 01 60 00 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

**1.03 REFERENCE STANDARDS**

- A. CSI/CSC Form 13.1A – Substitution Request (After the Bidding/Negotiation Phase).

**1.04 DEFINITIONS**

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
  - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
    - a. Unavailability.
    - b. Regulatory changes.
  - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
    - a. Substitution requests offering advantages solely to the Contractor will not be considered.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
  - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

- B. A Substitution Request for specified installer constitutes a representation that the submitter:
  - 1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
  - 1. Note explicitly any non-compliant characteristics.
- D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  - 1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.
- E. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.

### **3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT**

- A. Submittal Time Restrictions:
  - 1. Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.
- B. Submittal Form (before award of contract):
  - 1. Submit substitution requests by completing the form Request for Substitution at Time of Bid Form; see this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

### **3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION**

- A. Submittal Form (after award of contract):
  - 1. Submit substitution requests by completing CSI/CSC Form 13.1A – Substitution Request (After Bidding/Negotiating). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- B. Architect will consider requests for substitutions only within 15 days after date of Agreement.
- C. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- D. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
  - 1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
  - 2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
  - 3. Bear the costs engendered by proposed substitution of:
    - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
- E. Substitutions will not be considered under one or more of the following circumstances:
  - 1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.



**3.04 RESOLUTION**

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.
  - 1. Architect's decision following review of proposed substitution will be noted on the submitted form.

**3.05 ACCEPTANCE**

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

**3.06 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

**END OF SECTION**

**SECTION 01 30 00 – ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Construction progress schedule.
- E. Submittals for review, information, and project closeout.
- F. Number of copies of submittals.
- G. Requests for Interpretation (RFI) procedures.
- H. Submittal procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: General product requirements.

**1.03 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with 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 Substantial Completion.
  - 11. Closeout submittals.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRECONSTRUCTION MEETING**

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required:
  - 1. Owner.
  - 2. Architect.
  - 3. Contractor.
  - 4. Project Inspector
- C. 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, Project Inspector, and Architect.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.

### **3.02 PROGRESS MEETINGS**

- A. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
  1. Contractor.
  2. Owner.
  3. Architect.
  4. Project Inspector
  5. Contractor's superintendent.
  6. Major subcontractors.
- C. 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. Review of RFIs log and status of responses.
  7. Review of off-site fabrication and delivery schedules.
  8. Maintenance of progress schedule.
  9. Corrective measures to regain projected schedules.
  10. Planned progress during succeeding work period.
  11. Maintenance of quality and work standards.
  12. Effect of proposed changes on progress schedule and coordination.
  13. Other business relating to work.

### **3.03 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.

### 3.04 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 Contract Documents.
  - 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a 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. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- D. 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 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 compliance with 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, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
    - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- E. 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.
- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. 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.
- H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon 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.
- I. 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.

### **3.05 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 compliance with information given and the design concept expressed in 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 78 00 - Closeout Submittals.

### **3.06 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.

### **3.07 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
  - 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.

### **3.08 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Extra Copies at Project Closeout: See Section 01 78 00.
- C. 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.

### **3.09 SUBMITTAL PROCEDURES**

- A. General Requirements:
  - 1. Use a single transmittal for related items.
  - 2. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  - 3. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
  - 4. Apply Contractor's stamp, signed or initialed 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.
  5. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 15 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.
    - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
  6. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  7. Provide space for Contractor and Architect review stamps.
  8. When revised for resubmission, identify all changes made since previous submission.
  9. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
  10. 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.
  11. 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. 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 Contract Documents and coordinating related work.
  2. Do not reproduce Contract Documents 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.

### 3.10 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 consultants' actions on items submitted for review:
  1. Authorizing purchasing, fabrication, delivery, and installation:

- a. "Approved", or language with same legal meaning.
  - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
    - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
  - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
2. Not Authorizing fabrication, delivery, and installation:
- E. Architect's and 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**



**SECTION 01 40 00 - QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Contractor's construction-related professional design services.
- F. Contractor's design-related professional design services.
- G. Control of installation.
- H. Mock-ups.
- I. Tolerances.
- J. Manufacturers' field services.
- K. Defect Assessment.

**1.02 RELATED REQUIREMENTS**

- A. General Conditions: Inspections and approvals required by district and public authorities.
- B. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- C. Section 01 42 00 - Definitions and Standards.
- D. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

**1.03 REFERENCE STANDARDS**

- A. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2024.
- B. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2023.
- C. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.
- D. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.
- E. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.
- F. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.
- G. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2021.

**1.04 DEFINITIONS**

- A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.
- B. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
  - 1. Design Services Types Required:

- a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor's sole responsibilities for construction means, methods, techniques, sequences, and procedures.
- b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
- C. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

**1.05 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES**

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
  - 1. Temporary sheeting, shoring, or supports.
  - 2. Temporary scaffolding.
  - 3. Temporary bracing.
  - 4. Temporary foundation underpinning.
  - 5. Temporary stairs or steps required for construction access only.

**1.06 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES**

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
  - 1. Automatic Fire Sprinkler System.
  - 2. Standpipe System.
  - 3. Automatic Fire Alarm System.
  - 4. ERRC System
  - 5. Elevator Support Rails

**1.07 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for Owner's information.
  - 1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
    - a. Full name.
    - b. Professional licensure information.
    - c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.

- C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
  - 1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
  - 2. Include required product data and shop drawings.
  - 3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
  - 4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.
- D. 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. Compliance with Contract Documents.
    - k. When requested by Architect, provide interpretation of results.
  - 2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- E. 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 complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- F. 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.
- G. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
  - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
- H. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.

1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

#### 1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full-time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Contractor's Quality Control (CQC) Plan:

1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
  - a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
    - 1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.
  - b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
    - 1) Management and control of documents and records relating to quality.
    - 2) Communications.
    - 3) Coordination procedures.
    - 4) Resource management.
    - 5) Process control.
    - 6) Inspection and testing procedures and scheduling.
    - 7) Control of noncomplying work.
    - 8) Tracking deficiencies from identification, through acceptable corrective action, and verification.
    - 9) Control of testing and measuring equipment.
    - 10) Project materials certification.
    - 11) Managerial continuity and flexibility.
  - c. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.
  - d. Acceptance of the plan is required prior to start of construction activities not including mobilization work. Owner's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. Owner reserves the right to require

Contractor to make changes to the plan and operations, including removal of personnel, as necessary, to obtain specified quality of work results.

- D. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

### **1.09 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. Comply with 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 Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

### **1.10 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Owner will employ and pay for services of an independent testing agency to perform 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, 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 MOCK-UPS**

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the

following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- D. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- E. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- F. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
  - 1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
  - 2. Make corrections as necessary until Architect's approval is issued.
- G. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- H. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

### **3.03 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, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

### **3.04 TESTING AND INSPECTION**

- A. Testing Agency Duties:
  - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  - 2. Perform specified sampling and testing of products in accordance with specified standards.
  - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
  - 5. Perform additional tests and inspections required by Architect.
  - 6. 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, Construction Manager, Project Inspector, and laboratory 48 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-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

### **3.05 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment, as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect 30 days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

### **3.06 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Owner, it is not practical to remove and replace the work, Owner will direct an appropriate remedy or adjust payment.

**END OF SECTION**

**SECTION 01 42 00 – DEFINITIONS AND STANDARDS**

1. GENERAL

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and to other Division-1 Specification sections, apply to work of this section.

1.2 DEFINITIONS:

- A. Approved Drawings and/or Approved Plans and Specifications: Approved plans and specifications shall mean plans, specifications, addenda, change orders (Construction Change Documents), and other documents which have been duly approved by San Joaquin County Community Development Department, Building D
- B. General Explanation: A substantial amount of the specification language constitutes definitions for terms found in other contract documents, including drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in contract documents are defined generally in this article. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the work to the extent that they are not stated more explicitly in another provision of contract documents.
- C. General Requirements: The provisions or requirements of Division-1 sections. General Requirements apply to entire work of Contract and, where so indicated, to other elements which are included in the project.
- D. Indicated: The term “indicated” is a cross-reference to graphics, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar meanings of recording requirements in contract documents. Where terms such as “shown,” “noted,” “scheduled,” and “specified” are used in lieu of “indicated,” it is for the purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.
- E. Directed, Requested, etc: Where not otherwise explained terms such as “directed,” “requested,” “authorized,” “required,” “accepted,” and “permitted,” mean “directed by Architect/Engineer,” “requested by Architect/Engineer,” etc. However, no such implied meaning will be interpreted to extend Architect’s/Engineer’s responsibility into contractor’s area of construction supervision.
- F. Approve: Where used in conjunction with Architect’s/Engineer’s response to submittals, requests, application, inquiries, reports and claims by contractor, the meaning of the term “approved” will be held to limitations of Architect’s/Engineer’s responsibilities and duties as specified in General and Supplementary Conditions. In no case will “approval” by Architect/Engineer be interpreted as release of Contractor from responsibilities to fulfill requirements of contract documents.
- G. Project Site: The space available to Contractor for performance of the work, either exclusively or in conjunction with others performing other work as part of the project. The extent of project site is shown on drawings, and may or may not be identical with description of land upon which project is to be built.



- H. Furnish: Except as otherwise defined in greater detail, the term “Furnish” is used to mean supply and deliver to Project Site, ready for unloading, unpacking, assembly, installation, etc, as applicable in each instance.
- I. Install: Except as otherwise defined in greater detail, the term “install” is used to describe operations at project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
- J. Provide: Except as otherwise defined in greater detail, the term “provide” means furnish and install, complete and ready for intended use, as applicable in each instance.
- K. Installer: The entity (person or firm) engaged by contractor or its subcontractor or sub-subcontractor for performance of a particular unit of work at project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.
- L. Testing Laboratory: An independent entity engaged to perform specific inspections or tests of the work, either at project site or elsewhere; and to report and, if required, interpret results of those inspections or tests.

1.3 FORMAT AND SPECIFICATION EXPLANATIONS:

- A. Specification Production: None of these explanations will be interpreted to modify substance of requirements. Portions of these specifications have been produced by Architect’s Engineer’s standard methods of editing master specifications, and may contain minor deviations from traditional writing formats. Such deviations are a normal result of this production technique, and no other meaning will be implied or permitted.
- B. Format Explanation: The format of principal portions of these specifications can be described as follows: although other portions may not fully comply, and no particular significance will be attached to such compliance or non-compliance:
  - 1. Sections and Divisions: For convenience, basic unit of specification text is a “section,” each unit of which is named and numbered. These are organized into related families of sections, and various families of sections are organized into “divisions,” which are recognized as the present industry-consensus on uniform organization and sequencing of specifications. The section title is not intended to limit meaning or content of section, or to be fully descriptive of requirements specified therein, or to be an integral part of the text.
- C. Underscoring: Used strictly to assist the reader of specification text in scanning text for key words in content (for quick recall). No emphasis on or relative importance of text is intended where underscoring is used.
- D. Section Numbering: Used to facilitate cross-reference in contract documents. Sections are placed in Project Manual in numeric sequence; however, numbering sequence is not complete, and listing of sections at beginning of project manual must be consulted to determine numbers and names of specification sections in contract documents.
- E. Project Identification: Project name/number and date of contract documents (either complete or abbreviated) are recorded at top of each page of specifications minimize possible misuse of specifications, or confusion with other project specifications.

- F. Specification Content: Because of methods by which this project specification has been produced, certain general characteristics of content, and conventions in the use of language are explained as follows:
1. Specifying Methods: The techniques or methods of specifying to record requirements vary throughout text, and may include “prescriptive,” proprietary,” or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.
  2. Overlapping and Conflicting Requirements: Where compliance with two or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, most stringent requirement (which is generally recognized to be also most costly) is intended and will be enforced, unless specifically detailed language written into contract documents (not by way of reference to an industry standard) clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently-equal-but-different requirements, and certainties as to which level of quality is more stringent, to Architect for a decision before proceeding.
  3. Minimum Quality/Quantity: In every instance, quality level or quantity shown or specified is intended as minimum for the work to be performed or provided. Except as otherwise specifically indicated, actual work may either comply exactly with that minimum (within specified tolerances) or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of requirements. Refer instances of uncertainty to Architect/Engineer for decision before proceeding.
  4. Specialists; Assignments: In certain instances, specification text requires (or at least implies) that specific work be assigned to specialists or expert entities, who must be engaged for performance of those units of work. These must be recognized as special requirements over which contractor has no choice or option. These assignments must not be confused with (and are not intended to interfere with) normal application of regulations, union jurisdictions and similar conventions. One purpose of such assignments is to establish which party or entity involved in a specific unit of work is recognized as “expert” for indicated construction process or operations. Nevertheless, final responsibility for fulfillment of entire set of requirements remains with the Contractor.
  5. Trades: Except as otherwise indicated, the use of titles such as “carpentry” in specification text, implies neither that the work must be performed by an accredited or unionized trades person of corresponding generic name (such as “carpenter”) nor that specified requirements apply exclusively to work by trades persons of that corresponding generic name.
  6. Abbreviations: The language of specifications and other contract documents is of the abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in texts. Specific abbreviations have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of specification requirements with notations on drawings and in schedules. These are frequently defined in section at first instance of use. Trade association names and titles of general standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as

singular where applicable and where full context of the contract documents so indicates.

1.4 DRAWING SYMBOLS:

- A. General: Except as otherwise indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards," published by John Wiley & Sons, Inc. seventh edition.
- B. M/E Drawings: Graphic symbols used on mechanical, electrical drawings are generally aligned with symbols recommended by ASHRAE, supplemented by more specific symbols where appropriate as recommended by other recognized technical associations including ASME, ASPE, IEEE and similar organizations. Refer to instances of uncertainty to Architect/Engineer for clarification before proceeding.

1.5 INDUSTRY STANDARDS:

- A. General Applicability of Standards: Applicable standards of construction industry have some force and effect (and are made a part of contract documents by reference) as if copied directly into contract documents, or as if published copies were bound herewith.
  - 1. Referenced standards (referenced directly in documents or by governing regulations) have precedence over non-referenced standards which are recognized in industry for applicability to work.
  - 2. Non-referenced standards are hereby defined to have no particular applicability to the work, except as a general measurement of whether work complies with standards recognized in construction industry.
- B. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of contract documents.
- C. Copies of Standards: Provide where needed for proper performance of the work; obtain directly from publication sources.
- D. Abbreviations and Names: The following acronyms or abbreviations as referred to in contract documents are defined to mean the associated names. Both names and addresses are subject to change, and are believed to be, but are not assured to be accurate and up-to-date as of date of contract documents:

**AA**                    **Aluminum Association**  
1525 Wilson Boulevard, Suite 600, Arlington VA 22209  
703/358-2960 Fax 703/358-2961 – [www.aluminum.org](http://www.aluminum.org)

**AABC**                **Associated Air Balance Council**  
1518 K Street, NW, Suite 503, Washington, DC 20005  
202/737-0202 Fax 202/638-4833 – [www.aabc.com](http://www.aabc.com)

**AAMA**                **American Architectural Manufacturers Association**  
1827 Walden Office Square, Suite 550, Schaumburg, IL 60173-4268  
847/303-5664 – [www.aamanet.org](http://www.aamanet.org)

AASHTO	American Association of State Highway and Transportation Officials 444 North Capital Street, N.W., Suite 249, Washington, DC 20001 202/624-5800 Fax 202/624-5806 – <a href="http://www.transportation.org">www.transportation.org</a>
AATCC	American Association of Textile Chemists & Colorists P.O. Box 12215, Research Triangle Park, NC 27709 919/549-8141 Fax 919/549-8933 – <a href="http://www.aatcc.org">www.aatcc.org</a>
ACI	American Concrete Institute 38800 Country Club Drive, Farmington Hills, MI 48331 248/848-3700 Fax 248/848-3701 – <a href="http://www.concrete.org">www.concrete.org</a>
ACIL	American Council of Independent Laboratories 1629 K Street, N.W., Suite 400, Washington, DC 20006 202/887-5872 Fax 202/887-0021 – <a href="http://www.acil.org">www.acil.org</a>
ACPA	American Concrete Pipe Association 1303 West Walnut Hill Lane, Suite 205, Irving, TX 75038-2965 972/506-7216 Fax 972/506-7682– <a href="http://www.concrete-pipe.org">www.concrete-pipe.org</a>
ADC	Air Diffusion Council 1901 N. Roselle Road, Suite 800, Schaumburg, IL 60195 847/706-6750 Fax 847/706-6751 – <a href="http://www.flexibleduct.org">www.flexibleduct.org</a>
AF & PA	American Forest & Paper Association 1111 19 <sup>th</sup> Street, NW, Suite 800, Washington, DC 20036 800/878-8878 – <a href="http://www.afandpa.org">www.afandpa.org</a>
AGA	American Gas Association 400 N. Capitol Street, N.W., Washington, DC 20001 800/841-8430, 202/824-7000 Fax 202/824-7115 – <a href="http://www.aga.org">www.aga.org</a>
AHA	American Hardboard Association 1210 W. Northwest Highway, Palatine, IL 60067 847/934-8800 Fax 847/934-8803
AHAM	Association of Home Appliance Manufacturers 1111 19 <sup>th</sup> Street, Suite 402, N.W., Washington, DC 20036 202/872-5955 Fax 202/872-9354 – <a href="http://www.aham.org">www.aham.org</a>
AHRI	Air Conditioning, Heating, and Refrigeration Inst. 2111 Wilson Blvd, Suite 500, Arlington, VA 22201 703/524-8800 Fax 703/562-1942 – <a href="http://www.ahrinet.org">www.ahrinet.org</a>
AI	Asphalt Institute 2696 Research Park Drive, Lexington, KY 40511-8480 859/288-4960 Fax 859/288-4999 – <a href="http://www.asphaltinstitute.org">www.asphaltinstitute.org</a>
AIA	American Institute of Architects 1735 New York Avenue, N.W., Washington, DC 20006 202/626-7300 Fax 202/626-7426 – <a href="http://www.aia.org">www.aia.org</a>
A.I.A.	American Insurance Association 1130 Connecticut Avenue, N.W., Suite 100, Washington DC 20036 202/828-7100 Fax 202/293-1219 – <a href="http://www.aiadc.org">www.aiadc.org</a>

AISC	American Institute of Steel Construction 1 E. Wacker Drive, Suite 700, Chicago, IL 60601 312/670-2400 Fax 312/670-5403 – <a href="http://www.aisc.org">www.aisc.org</a>
AISI	American Iron and Steel Institute 25 Massachusetts Avenue, NW Suite 800, Washington DC 20001 202/452-7100 – <a href="http://www.steel.org">www.steel.org</a>
AITC	American Institute of Timber Construction 7012 S. Revere Parkway, Suite 140, Centennial, CO 80112 303/792-9559 Fax 303/792-0669 – <a href="http://www.aitc-glulam.org">www.aitc-glulam.org</a>
ALSC	American Lumber Standards Committee, Inc. P. O. Box 210, Germantown, MD 20875 301/972-1700 Fax 301/540-8004 – <a href="http://www.aslc.org">www.aslc.org</a>
AMCA	Air Movement and Control Association 30 W. University Drive, Arlington Heights, IL 60004 847/394-0150 Fax 847/253-0088 – <a href="http://www.amca.org">www.amca.org</a>
ANLA	American Nursery and Landscape Association 1000 Vermont Ave NW, Suite 300, Washington, DC 20005 202/789-2900 Fax 202/789-1893 – <a href="http://www.anla.org">www.anla.org</a>
ANSI	American National Standards Institute 25 West 43 <sup>rd</sup> Street, 4 <sup>th</sup> Floor, New York, NY 10036 212/642-4900 Fax 212/398-0023 – <a href="http://www.ansi.org">www.ansi.org</a>
APA	APA – The Engineered Wood Association 7011 South 19 <sup>th</sup> , Tacoma, WA 98466 253/565-6600 Fax 253/565-7265 – <a href="http://www.apawood.org">www.apawood.org</a>
APA	Architectural Precast Association 6710 Winkler Road, Suite 8, Fort Myers, Florida 33919 239/454-6989 Fax 239/454-6787 – <a href="http://www.archprecast.org">www.archprecast.org</a>
API	American Petroleum Institute 1220 L Street NW, Washington DC 20005-4070 202/682-8000 – <a href="http://www.api.org">www.api.org</a>
ARMA	Asphalt Roofing Manufacturers Association 750 National Press Building, 529 14 <sup>th</sup> Street NW, Washington, DC 20045 202/207-0917 Fax 202/223-9741 – <a href="http://www.asphaltroofing.org">www.asphaltroofing.org</a>
ASA	Acoustical Society of America 2 Huntington Quadrangle, Suite 1NO1, Melville, NY 11747-4502 516/576-2360 Fax 516/576-2377
ASC	Adhesive and Sealant Council 7979 Old Georgetown Road, Suite 500, Bethesda, MD 20814 301/986-9700 Fax 301/986-9795 – <a href="http://www.ascouncil.org">www.ascouncil.org</a>

ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive, Reston, VA 20191 800/548-2723 Fax 703/295-6000 – <a href="http://www.asce.org">www.asce.org</a>
ASHRAE	American Society of Heating Refrigerating & Air Conditioning Engineers 1791 Tullie Circle, N.E., Atlanta, GA 30329 404/636-8400 Fax 404/321-5478 – <a href="http://www.ashrae.org">www.ashrae.org</a>
ASLA	American Society of Landscape Architects 4401 Connecticut Ave., NW, 5 <sup>th</sup> Floor, Washington, DC 20008-2369 202/686-2752 – <a href="http://www.asla.org">www.asla.org</a>
ASME	American Society of Mechanical Engineers Three Park Avenue, New York, NY 10016-5990 800/843-2763 Fax 212/591-7674 – <a href="http://www.asme.org">www.asme.org</a>
ASPE	American Society of Plumbing Engineers 8614 W. Catalpa Avenue, Suite 1007, Chicago, IL 60656 773/693-ASPE Fax 773/695-9007 – <a href="http://www.aspe.org">www.aspe.org</a>
ASQC	American Society of Quality Control 611 E. Wisconsin Ave., Milwaukee, WI 53201-3005 800/248-1946 Fax 414/272-8575 – <a href="http://www.asqc.org">www.asqc.org</a>
ASSE	American Society of Sanitary Engineering 901 Canterbury, Suite A, Westlake, OH 44145 440/835-3040 Fax 440/835-3488 – <a href="http://www.asse-plumbing.org">www.asse-plumbing.org</a>
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959 610/832-9585 Fax 610/832-9555 – <a href="http://www.astm.org">www.astm.org</a>
AWCI	Association of the Wall and Ceiling Industries 307 East Annandale Road, Suite 200, Falls Church, VA 22042-2433 703/534-8300 – <a href="http://www.awci.org">www.awci.org</a>
AWI	Architectural Woodwork Institute 1952 Issac Newton Square W. Reston, VA 20190 703/733-0600 Fax 703/733-0584 – <a href="http://www.awinet.org">www.awinet.org</a>
AWPA	American Wood Protection Association P.O. Box 361784, Birmingham, AL 35236-1784 205/733-4077 Fax 205/733-4075 – <a href="http://www.awpa.com">www.awpa.com</a>
AWS	American Welding Society 550 N.W. LeJeune Road, Miami, FL 33126 305/443-9353 800/443-9353 Fax 305/443-7559 – <a href="http://www.aws.org">www.aws.org</a>
AWWA	American Water Works Association 6666 W. Quincy Avenue, Denver, CO 80235 800/926/7337 Fax 303/347/0804 – <a href="http://www.awwa.org">www.awwa.org</a>
BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 17 <sup>th</sup> Floor, New York, NY 10017 212/297-2122 Fax 212/370-9047 – <a href="http://www.buildershardware.com">www.buildershardware.com</a>

BIA	The Brick Industry Association 11490 Commerce Park Drive, Reston, VA 20191-1525 703/620-0010 Fax 703/620-3928 – <a href="http://www.bia.org">www.bia.org</a>
CBC	California Building Code
CCR	California Code of Regulations
CDA	Copper Development Association 260 Madison Avenue, 16 <sup>th</sup> Floor, New York, NY 10016 212/251-7200 Fax 212/251-7234 – <a href="http://www.copper.org">www.copper.org</a>
CE	Corps of Engineers (U.S. Dept of the Army) Washington, DC 20314
CFR	Code of Federal Regulations Available from Government Printing Office Washington, DC 20402 (8s8ally first published in Federal Register)
CFSEI	Cold-Formed Steel Engineers Institute 25 Massachusetts Avenue, NW, Suite 800, Washington, DC 20001 202/263-4488 F 202/452-1039 – <a href="http://www.cfsei.org">www.cfsei.org</a>
CGA	Compressed Gas Association 1725 Jefferson Davis Hwy, Suite 1004, Arlington, VA 22202-4102 703/412-0900 – <a href="http://www.cganet.com">www.cganet.com</a>
CGS	California Geological Survey (Department of Conservation)
CISCA	Ceiling and Interior Systems Construction Association 1500 Lincoln Hwy, Suite 202, St. Charles, IL 60174 630/584-1919 – <a href="http://www.cisca.org">www.cisca.org</a>
CISPI	Cast Iron Soil Pipe Institute 5959 Shallowford Road, Suite 419, Chattanooga, TN 37421 423/892-0137 Fax 423/892-0817 – <a href="http://www.cispi.org">www.cispi.org</a>
CPA	Composite Panel Association 18922 Premiere Court, Gaithersburg, MD 20879-1574 301/670-0604 Fax 301/840-1252 – <a href="http://www.pbmdf.com">www.pbmdf.com</a>
CRA	California Redwood Association 405 Enfrente Drive, Ste 200 Novato, CA 94949 888/225-7339 Fax 415/282-0662 – <a href="http://www.calredwood.org">www.calredwood.org</a>
CRI	Carpet and Rug Institute 310 S. Holiday Avenue, Dalton, GA 30722-2048 800/882-8846 Fax 706/278-3176 – <a href="http://www.carpet-rug.org">www.carpet-rug.org</a>
CRRC	Cool Roof Rating Council 449 15 <sup>th</sup> Street, Suite 200, Oakland, CA 94612 866/465-2523 F 510/482-4421 – <a href="http://www.coolroofs.org">www.coolroofs.org</a>

CRSI	Concrete Reinforcing Steel Institute 933 N. Plumb Grove Road, Schaumburg, IL 60173-4758 847/517-1200 Fax 847/517-1206 – <a href="http://www.crsi.org">www.crsi.org</a>
CS	Commercial Standard of NBS (U.S. Dept. of Commerce) Government Printing Office, Washington, DC 20402
CSI	Construction Specification Institute (The) 110 South Union Street, Suite 100, Alexandria, VA 22314 800/689-2900 F 703/236-4600 – <a href="http://www.csinet.org">www.csinet.org</a>
CSFM	California State Fire Marshal
CTI	Ceramic Tile Institute of America 12061 W. Jefferson Blvd., Culver City, CA 90230-6219 310/574-7800 F 310/821-4655 – <a href="http://www.ctioa.org">www.ctioa.org</a>
DHI	Door and Hardware Institute 14150 Newbrook Drive, Suite 200, Chantilly, VA 20151 703/222-2010 Fax 703/222-2410 – <a href="http://www.dhi.org">www.dhi.org</a>
EJMA	Expansion Joint Manufacturers Association 25 N Broadway, Tarrytown, NY 10591-3201 914/332-0040 Fax 914/332-1541 – <a href="http://www.ejma.org">www.ejma.org</a>
ESD	ESD Association (Electrostatic Discharge Association) 7900 Turin Road, Building 3, Rome, NY 13440-2069 315/339-6937 F 315/339-6793 – <a href="http://www.esda.org">www.esda.org</a>
FAA	Federal Aviation Administration (U.S. Dept. of Transportation) 800 Independence Avenue, S.W., Washington, DC 20590
FCC	Federal Communications Commission 1919 M. Street, N.W., Washington, DC 20554 202/632-7000
FCI	Fluid Controls Institute 1300 Sumner Avenue, Cleveland, OH 44115-2851 216/241-7333 Fax 216/241-0105 – <a href="http://www.fluidcontrolsinstitute.org">www.fluidcontrolsinstitute.org</a>
FCICA	Floor Covering Installation Contractors Association P.O. Box 948, Dalton, GA 30722-0948 706/226-5488
FHA	Federal Housing Administration (U.S. Dept. of HUD) 451 7 <sup>th</sup> Street, S.W., Washington, DC 20410-1422 202/708-1112 Fax 202/708-1455
FM	FM Approvals (Factory Mutual Insurance Company) 270 Central Avenue, Johnston, RI 02919-4923 401/275-3000 Fax 401/275-3029 – <a href="http://www.fmglobal.com/approvals">www.fmglobal.com/approvals</a>



FS	Federal Specification (General Services Admin) Obtain from your Regional GSA Office or purchase from GSA Specifications Unit (WFSIS) 7 <sup>th</sup> and D Streets, S.W., Washington, DC 20406 202/472-2205 or 2140
GA	Gypsum Association 810 1 <sup>st</sup> Street. N.E., Suite 510, Washington, D.C. 20002 202/289-5440 Fax 202/289-3707 – <a href="http://www.gypsum.org">www.gypsum.org</a>
GANA	Glass Association of North America 2945 SW Wanamaker Drive, Suite A, Topeka, KS 66614-5321 785/271-0208 Fax 785/271-0166 – <a href="http://www.glasswebsite.com">www.glasswebsite.com</a>
HMA	Hardwood Manufacturers Association 400 Penn Center Blvd., Suite 530, Pittsburgh, PA 15235-5605 412/828-0770 – <a href="http://www.hardwood.org">www.hardwood.org</a>
HPVA	Hardwood Plywood and Veneer Association 1825 Michael Faraday Drive, Reston, VA 20190 703/435-2900 Fax 703/435-2537 – <a href="http://www.hpva.org">www.hpva.org</a>
ICC	International Code Council 5360 Workman Mill Road, Whittier, CA 90601 888/422-7233 Fax 562/908-5524 – <a href="http://www.iccsafe.org">www.iccsafe.org</a>
IEEE	Institute of Electrical and Electronic Engineers, Inc 445 Hoes Lane, Piscataway, New Jersey 08854-1331 732/981-0060 Fax 732/981-1721 – <a href="http://www.ieee.org">www.ieee.org</a>
IESNA	Illuminating Engineering Society of North America 120 Wall Street, Floor 17, New York, NY 10005-4001 212/248-5000 Fax 212/248-5017 – <a href="http://www.iesna.org">www.iesna.org</a>
ISA	International Society of Automation 67 Alexander Drive, Research Triangle Park, NC 27709 919/549-8411 – <a href="http://www.isa.org">www.isa.org</a>
ISFA	International Surface Fabricators Association 2400 Wildwood Road, Gibsonsia, PA 15044 877/464-7732 F 412/487-3269 – <a href="http://www.isfanow.org">www.isfanow.org</a>
ISO	International Organization for Standardization <a href="http://www.iso.org">www.iso.org</a>
LMA	See CPA
MCA	Metal Construction Association 8735 W. Higgins Road, Suite 300, Chicago IL 60631 847/375-4718 Fax 847/990-9690 – <a href="http://www.metalconstruction.org">www.metalconstruction.org</a>
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive, Rockville, MD 20850-4239 301/869-5800 Fax 301/990-9690 – <a href="http://www.mcaa.org">www.mcaa.org</a>

MIA	Marble Institute of America 28901 Clemens Rd, Suite 100, Westlake, OH 44145 440/250-9222 Fax 440/250-9223 – <a href="http://www.marble-institute.com">www.marble-institute.com</a>
MIL	Military Standardization Documents (U.S. Dept of Defense) Naval Publications & Forms Center 5801 Tabor Ave, Philadelphia, PA 19120
ML/SFA	Metal Lath/Steel Framing Association/Division of Naamm 8 S. Michigan Avenue, Chicago, IL 60603 312/332-0405 Fax 312/332-0706 – <a href="http://www.naamm.org">www.naamm.org</a>
MSS	Manufacturers Standardization Society of the Valve & Fittings Industry 127 Park Street, N.E., Vienna, VA 22180 703/281-6613 Fax 703/281-6671 – <a href="http://www.mss-hq.org">www.mss-hq.org</a>
NAAMM	National Association of Architectural Metal Manufacturers 8 S. Michigan Avenue, Chicago, IL 60603 312/332-0405 Fax 312/332-0706 – <a href="http://www.naamm.org">www.naamm.org</a>
NAIMA	North American Insulation Manufacturers Association 44 Canal Center Plaza, Suite 310, Alexandria, VA 22314 703/684-0084 – <a href="http://www.naima.org">www.naima.org</a>
NAPA	National Asphalt Pavement Association NAPA Building, 5100 Forbes Blvd., Lanham, MD 20706-4413 888/468-6499 – <a href="http://www.hotmix.org">www.hotmix.org</a>
NBQQA	National Building Granite Quarries Association 1220 L Street, NW, Suite 100-167, Washington, DC 20005 800/577-2848 – <a href="http://www.nbqqa.com">www.nbqqa.com</a>
NBS	National Bureau of Standards (U.S. Dept. of Commerce) Gaithersburg, MD 20899 301/475-5902 Fax 301/1475-4032
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171-4662 703/713-1900 Fax 703/713-1910 – <a href="http://www.ncma.org">www.ncma.org</a>
NCSPA	National Corrugated Steel Pipe Association 1255 23 <sup>rd</sup> Street, NW, Suite 850, Washington, DC 20037 202/452-1700 – <a href="http://www.ncspa.org">www.ncspa.org</a>
NEC	National Electrical Code (by NFPA)
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100, Bethesda, MD 20814 301/657-3110 Fax 301/215-4500 – <a href="http://www.necanet.org">www.necanet.org</a>
NEII	National Elevator Industry, Inc. 1677 County Route 64, P.O. Box 838, Salem, NY 12865-0838 518/854-3100 Fax 518/854-3257 – <a href="http://www.neii.org">www.neii.org</a>

NEMA	National Electrical Manufacturers Association 1300 North 17 <sup>th</sup> Street, Suite 1752, Rosslyn, VA 22209 703/841-3200 Fax 703/841-5900 – <a href="http://www.nema.org">www.nema.org</a>
NFPA	National Fire Protection Association 1 Batterymarch Park, Quincy, MA 02169-7471 617/770-3000 800/334-3555 Fax 617/770-0700 – <a href="http://www.nfpa.org">www.nfpa.org</a>
NHLA	National Hardwood Lumber Association 6830 Raleigh LaGrange Road, Memphis, TN 38134 901/377-1818 Fax 901/382-6419 – <a href="http://www.natlhardwood.org">www.natlhardwood.org</a>
NIST	National Institute of Standards and Technology (U.S. Dept of Commerce) 100 Bureau Drive, Stop 3460, Gaithersburg, MD 20899 301/975-2758 Fax 301/926-1630
NRCA	National Roofing Contractors Association O'Hare International Center 10255 W. Higgins Road, Suite 600, Rosemont, IL 60018-5607 847/299-9070 Fax 847/299-1183 – <a href="http://www.nrca.net">www.nrca.net</a>
NSF	National Sanitation Foundation International P.O. Box 130140, 789 N. Dixboro Road, An Arbor, MI 48113-0140 734/769-8010 Fax 734/769-0109 – <a href="http://www.nsf.org">www.nsf.org</a>
NSSEA	National School Supply & Equipment Association 8300 Colesville Road, Suite 250, Silver Spring, MD 20910 301/495-0240 Fax 301/495-3330 – <a href="http://www.nssea.org">www.nssea.org</a> or <a href="http://www.teacherstores.com">www.teacherstores.com</a>
NTMA	National Terrazzo & Mosaic Association 201 North Maple, Suite 208, Purcellville, VA 20132 800/323-9736 Fax 540/751-0935 – <a href="http://www.ntma.com">www.ntma.com</a>
NUSIG	National Uniform Seismic Installation Guidelines 12 Lohoma Court, Alamo, CA 94526 510/946-0135
NWWDA	National Wood Window and Door Association 1400 E. Touhy Avenue, G-54, Des Plaines, IL 60018 800/223-2301 Fax 847/229-5200 – <a href="http://www.nwwda.org">www.nwwda.org</a>
OSHA	Occupational Safety Health Administration (U.S. Dept. of Labor) 200 Constitution Avenue, N.W. N2625, Washington, DC 20210 202/693-1999 Fax 202/693-1634
PCA	Portland Cement Association 5420 Old Orchard Road, Skokie, IL 60077-1083 847/966-6200 Fax 847/966-8389 – <a href="http://www.cement.org">www.cement.org</a>
PCI	Precast/Pre-stressed Concrete Institute 209 W. Jackson Blvd., Chicago, IL 60606-6938 312/786-0300 Fax 312/786-0355 – <a href="http://www.pci.org">www.pci.org</a>

<b>PDCA</b>	<b>Painting and Decorating Contractors of America</b> 3913 Old Lee Hwy, Suite 33-B, Fairfax, VA 22030 800/332-7322 Fax 703/359-0826 – <a href="http://www.pdca.com">www.pdca.com</a>
<b>PDI</b>	<b>Plumbing and Drainage Institute</b> 800 Turnpike Street, Suite 300, North Andover, MA 01845 800/589-8956 Fax 978/557-0721 – <a href="http://www.pdionline.org">www.pdionline.org</a>
<b>PEI</b>	<b>Porcelain Enamel Institute</b> P.O. Box 920220, Norcross, GA 30010 770/281-8980 Fax 770/281-8981 – <a href="http://www.porcelainenamel.com">www.porcelainenamel.com</a>
<b>PS</b>	<b>Product Standard of NBS (U.S. Dept of Commerce)</b> Government Printing Office, Washington, DC 20402
<b>RFCI</b>	<b>Resilient Floor Covering Institute</b> 401 E. Jefferson Street, Suite 102, Rockville, MD 20850-2617 301/340-8580 Fax 301/340-7283 – <a href="http://www.rfci.com">www.rfci.com</a>
<b>RIS</b>	<b>Redwood Inspection Service (Grading Rules)</b> California Redwood Association 405 Enfrente Drive, Ste 200 Novato, CA 94949 888/225-7339 Fax 415/282-0662 – <a href="http://www.calredwood.org">www.calredwood.org</a>
<b>SDI</b>	<b>Steel Deck Institute</b> P.O. Box 25, Fox River Grove, IL 60021-0025 847/458-4647 Fax 847/458-4648 – <a href="http://www.sdi.org">www.sdi.org</a>
<b>SDI</b>	<b>Steel Door Institute</b> 30200 Detroit Road, Cleveland, OH 44145-1967 440/899-0010 Fax 440/892-1404 – <a href="http://www.steeldoor.org">www.steeldoor.org</a>
<b>SIGMA</b>	<b>Sealed Insulating Glass Manufacturers Assoc.</b> 401 N. Michigan Avenue, Suite 2400, Chicago, IL 60611 312/644-6610 Fax 312/321-6869
<b>SJI</b>	<b>Steel Joist Institute</b> 3127 10 <sup>th</sup> Avenue, N. Myrtle Beach, SC 29577 843/626-1995 Fax 843/626-5565 – <a href="http://www.steeljoist.org">www.steeljoist.org</a>
<b>SMA</b>	<b>Stucco Manufacturers Association</b> 2402 Vista Nobleza, Newport Beach, CA 92660 949/640-9902 Fax 949/640-9911 – <a href="http://www.stuccomfgassoc.com">www.stuccomfgassoc.com</a>
<b>SMACNA</b>	<b>Sheet Metal &amp; Air Conditioning Contractor's International Association</b> 4201 Lafayette Center Drive, Chantilly, VA 22022-1209 703/803-2980 Fax 703/803-3732 – <a href="http://www.smacna.org">www.smacna.org</a>
<b>SPI</b>	<b>Society of Plastics Industry, Inc.</b> 1801 K Street, NW, Suite 600K, Washington, DC 20006 800/951-2001 – <a href="http://www.socplas.org">www.socplas.org</a>

<b>SPIB</b>	<b>Southern Pine Inspection Bureau (Grading Rules)</b> 4709 Scenic Hwy., Pensacola, FL 32504 904/434-2611 – <a href="http://www.spib.org">www.spib.org</a>
<b>SSPC</b>	<b>Society for Protective Coatings</b> 40 24 <sup>th</sup> St. 6 <sup>th</sup> Floor, Pittsburgh, PA 15222-4623 412/281-2331 Fax 412/281-9992 – <a href="http://www.sspc.org">www.sspc.org</a>
<b>TCA</b>	<b>Tile Council of America, Inc.</b> 100 Clemson Research Blvd., Anderson, SC 29625 864/646-8453 – <a href="http://www.tileusa.com">www.tileusa.com</a>
<b>TPI</b>	<b>Truss Plate Institute</b> 583 D'onofrio Drive, Suite 200, Madison, WI 53719 608/833-5900 Fax 608/833-4360 – <a href="http://www.tpinst.org">www.tpinst.org</a>
<b>UL</b>	<b>Underwriters Laboratories</b> 333 Pfingsten Road, Northbrook, IL 60062 847/272-8800 Fax 847/272-8129 – <a href="http://www.ul.com">www.ul.com</a>
<b>WCLIB</b>	<b>West Coast Lumber Inspection Bureau (Grading Rules)</b> P.O. Box 23145, Portland, OR 97223 503/639-0651 – <a href="http://www.wclib.org">www.wclib.org</a>
<b>WCMA</b>	<b>Window Covering Manufacturers Association</b> 355 Lexington Ave., 17 <sup>th</sup> Floor, New York, NY 10017-6603 212/661-4261
<b>WI</b>	<b>Woodwork Institute</b> P.O. Box 980247, West Sacramento, CA 95798-0247 916/372-9943 Fax 916/372-9950 – <a href="http://www.woodworkinstitute.com">www.woodworkinstitute.com</a>
<b>WLPDIA</b>	<b>Western Lath/Plaster/Drywall Industries Association</b> 8635 Navajo Road, San Diego, CA 92119 619/466-9070
<b>WMMPA</b>	<b>Wood Moulding &amp; Millwork Producers Association</b> 507 First Street, Woodland, CA 95695 800/550-7889 Fax 916/661-9591 – <a href="http://www.wmmpa.com">www.wmmpa.com</a>
<b>WRI</b>	<b>Wire Reinforcement Institute</b> 942 Main Street, Suite 300, Hartford, CT 06103 800/542-4974 Fax 860/808-3009
<b>WWPA</b>	<b>Western Wood Products Association (Grading rules)</b> 522 S.W. 5 <sup>th</sup> Avenue, Suite 500, Portland, OR 97204 503/224-3930 Fax 503/224-3934 – <a href="http://www.wwpa.org">www.wwpa.org</a>
<b>W.W.P.A.</b>	<b>Woven Wire Products Association</b> 1641 E. Higgins Lake Drive, Roscommon, MI 48653 517/821-6621

1.6 GOVERNING REGULATIONS/AUTHORITIES:

General: The procedure followed by Architect has been to governing authorities where necessary to obtain information needed for the purpose of preparing contract documents; recognizing that such information may or may not be of significance in relation to Contractor's responsibilities for performing the work. Contact governing authorities directly for necessary information and decisions that have a bearing on performance of the work.

1.7 SUBMITTALS:

Permits, Licenses and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

**END OF SECTION 01 42 00**

**SECTION 01 45 33 – CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.
- D. Manufacturers' field services.
- E. Fabricators' field services.

**1.02 RELATED REQUIREMENTS**

- A. General Conditions: Inspections and approvals required by public authorities.
- B. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- C. Section 01 40 00 - Quality Requirements.
- D. Section 01 42 00 – Definitions and Standards.
- E. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

**1.03 ABBREVIATIONS AND ACRONYMS**

- A. AHJ: Authority having jurisdiction.
- B. IAS: International Accreditation Service, Inc.
- C. NIST: National Institute of Standards and Technology.

**1.04 DEFINITIONS**

- A. Code or Building Code: 2022 Edition of the California Building Code and specifically, Chapter 17 - Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspection:
  - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
  - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

**1.05 REFERENCE STANDARDS**

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. AISC 360 - Specification for Structural Steel Buildings; 2022, with Errata (2023).
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- D. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2024.

- E. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2017.
- F. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.
- G. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.
- H. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.
- I. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2020a.
- J. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2020a.
- K. ASTM E2570/E2570M - Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage; 2007 (Reapproved 2019).
- L. AWCI 117 - Technical Manual 12-B; Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide; 2014.
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).
- N. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).
- O. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).
- P. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2021.
- Q. SDI (QA/QC) - Standard for Quality Control and Quality Assurance for Installation of Steel Deck; 2017.

#### **1.06 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
  - 1. Submit agency name, address, and telephone number, names of full-time registered Engineer and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  - 3. Submit certification that Special Inspection Agency is acceptable to AHJ.
- C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:
  - 1. Submit agency name, address, and telephone number, and names of full-time registered Engineer and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  - 3. Submit certification that Testing Agency is acceptable to AHJ.
- D. Manufacturer's Qualification Statement: Manufacturer is required to submit documentation of manufacturing capability and quality control procedures. Include documentation of AHJ approval.



- E. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures. Include documentation of AHJ approval.
- F. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least five copies of report; one to each of the following: Owner, CM, Architect, Project Inspector, and the AHJ.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of Special Inspector.
    - d. Date and time of special inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of special inspection.
    - h. Date of special inspection.
    - i. Results of special inspection.
    - j. Compliance with Contract Documents.
  - 2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
- G. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector is required to promptly submit at least five copies of report; one to each of the following: Owner, CM, Architect, Project Inspector, and the AHJ.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of Special Inspector.
    - d. Date and time of special inspection.
    - e. Identification of fabricated item and specification section.
    - f. Location in the Project.
    - g. Results of special inspection.
    - h. Verification of fabrication and quality control procedures.
    - i. Compliance with Contract Documents.
    - j. Compliance with referenced standard(s).
- H. Test Reports: After each test or inspection, promptly submit at least five copies of report; one to each of the following: Owner, CM, Architect, Project Inspector, and the AHJ.
  - 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 or inspection.
  - h. Date of test or inspection.
  - i. Results of test or inspection.
  - j. Compliance with Contract Documents.
- I. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor the following: Owner, CM, Architect, Project Inspector, and the AHJ, in quantities specified for Product Data.
- 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- J. Manufacturer's Field Reports: Submit reports to the following: Owner, CM, Architect, Project Inspector, and the AHJ.
- 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.
- K. Fabricator's Field Reports: Submit reports to the following: Owner, CM, Architect, Project Inspector, and the AHJ.
- 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.

**1.07 SPECIAL INSPECTION AGENCY**

- A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

**1.08 TESTING AND INSPECTION AGENCIES**

- A. Owner may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

**1.09 QUALITY ASSURANCE**

- A. Special Inspection Agency Qualifications:
  - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
- B. Testing Agency Qualifications:
  - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL**

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
  - 1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
  - 2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

**3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION**

- A. Structural Steel: Comply with quality assurance inspection requirements of ICC (IBC)-2018.
- B. Cold-Formed Steel Deck: Comply with quality assurance inspection requirements of SDI (QA/QC).
- C. High-Strength Bolt, Nut and Washer Material:
  - 1. Verify identification markings comply with ASTM standards specified in the approved contract and to AISC 360, Section A3.3; periodic.
  - 2. Submit manufacturer's certificates of compliance; periodic.
- D. High-Strength Bolting Installation: Verify items listed below comply with AISC 360, Section M2.5.
  - 1. Snug tight joints; periodic.
  - 2. Pretensioned and slip-critical joints with matchmarking, twist-off bolt or direct tension indicator method of installation; periodic.
  - 3. Pretensioned and slip-critical joints without matchmarking or calibrated wrench method of installation; continuous.
- E. Structural Steel and Cold Formed Steel Deck Material:
  - 1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
  - 2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved Contract Documents; periodic.
  - 3. Submit manufacturer's certificates of compliance and test reports; periodic.
- F. Weld Filler Material:
  - 1. Verify identification markings comply with AWS standards specified in the approved Contract Documents and to AISC 360, Section A3.5; periodic.
  - 2. Submit manufacturer's certificates of compliance; periodic.
- G. Welding:
  - 1. Structural Steel and Cold Formed Steel Deck:
    - a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
    - b. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.

- c. Single Pass Fillet Welds Less than 5/16 inch (7.94 mm) Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
  - d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
  - e. Single Pass Fillet Welds 5/16 inch (7.94 mm) or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.
  - f. Floor and Roof Deck Welds: Verify compliance with AWS D1.3/D1.3M; continuous.
2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI CODE-318, Section 3.5.2.
- a. Verification of weldability; periodic.
  - b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as where it is referenced in older codes. Elements of special structural walls of concrete and shear reinforcement; continuous.
  - c. Shear reinforcement; continuous.
  - d. Other reinforcing steel; periodic.
- H. Steel Frame Joint Details: Verify compliance with approved Contract Documents.
- 1. Details, bracing and stiffening; periodic.
  - 2. Member locations; periodic.
  - 3. Application of joint details at each connection; periodic.

### 3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

- A. Reinforcing Bar Welding: Verify compliance with AWS D1.4/D1.4M and ACI CODE-318, 26.6.4; periodic.
- 1. Verify weldability of reinforcing bars other than those complying with ASTM A706/A706M; periodic.
  - 2. Inspect single-pass fillet welds, maximum 5/16 inch; periodic.
  - 3. Inspect all other welds; continuous.
- B. Anchors Cast in Concrete: Verify compliance with ACI CODE-318; periodic.
- C. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved Contract Documents and ACI CODE-318, Sections 8.1.3 and 21.2.8 prior to and during placement of concrete; continuous.
- D. Anchors Post-Installed in Hardened Concrete: Verify compliance with ACI CODE-318.
- 1. Adhesive Anchors: Verify horizontally or upwardly-inclined orientation installations resisting sustained tension loads - Section 17.8.2.4; continuous.
  - 2. Other Mechanical and Adhesive Anchors: Verify as per Chapter 17.8.2; periodic.
- E. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M, and ACI CODE-318, Chapter 26.5, 26.12, and record the following, continuous:
- 1. Slump.
  - 2. Air content.
  - 3. Temperature of concrete.

**3.04 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION**

- A. Masonry Structures Subject to Special Inspection:
  - 1. Empirically designed masonry, glass unit masonry and masonry veneer in structures designated as "essential facilities".
  - 2. Engineered masonry in structures classified as "low hazard..." and "substantial hazard to human life in the event of failure".
- B. Verify each item below complies with approved Contract Documents and the applicable articles of TMS 402/602.
  - 1. Inspections and Approvals:
    - a. Verify compliance with the required inspection provisions of the approved Contract Documents; periodic.
    - b. Verify approval of submittals required by Contract Documents; periodic.
  - 2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
  - 3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
  - 4. Joints and Accessories: When masonry construction begins, verify:
    - a. Proportions of site prepared mortar; periodic.
    - b. Construction of mortar joints; periodic.
    - c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc; periodic.
  - 5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:
    - a. Size and location of structural elements; periodic.
    - b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
    - c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
    - d. Welding of reinforcing bars; continuous.
  - 6. Grouting Preparation: Prior to grouting, verify:
    - a. Grout space is clean; periodic.
    - b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.
    - c. Correctly proportioned site prepared grouts and prestressing grout for bonded tendons; periodic.
    - d. Correctly constructed mortar joints; periodic.
  - 7. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.

**3.05 SPECIAL INSPECTIONS FOR SOILS**

- A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
  - 1. Design bearing capacity of material below shallow foundations; periodic.

2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
  3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
  4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.
- B. Testing: Classify and test excavated material; periodic.

**3.06 SPECIAL INSPECTIONS FOR HELICAL PILE FOUNDATIONS**

- A. Materials, Equipment and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
1. Type and capacity of installation equipment used; continuous.
  2. Pile dimensions; continuous.
  3. Tip elevation; continuous.
  4. Final depth; continuous.
  5. Final installation torque; continuous.
  6. Other installation data requested in writing by Architect; continuous.

**3.07 SPECIAL INSPECTIONS FOR MASTIC AND INTUMESCENT FIRE RESISTANT COATINGS**

- A. Verify mastic and intumescent fire-resistant coatings comply with AWCI 117 and the fire resistance rating indicated on approved Contract Documents.

**3.08 SPECIAL INSPECTIONS FOR EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)**

- A. Verify water resistive barrier coating applied over sheathing complies with ASTM E2570/E2570M.

**3.09 SPECIAL INSPECTIONS FOR FIRE RESISTANT PENETRATIONS AND JOINTS**

- A. Verify penetration firestops in accordance with ASTM E2174.
- B. Verify fire resistant joints in accordance with ASTM E2393.

**3.10 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES**

- A. Special Inspection Agency shall:
1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  2. Perform specified sampling and testing of products in accordance with specified reference standards.
  3. Ascertain compliance of materials and products with requirements of Contract Documents.
  4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
  5. Perform additional tests and inspections required by Architect.
  6. Submit reports of all tests or inspections specified.
- B. Limits on Special 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. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

### **3.11 TESTING AGENCY DUTIES AND RESPONSIBILITIES**

- A. Testing Agency Duties:
  - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  - 2. Perform specified sampling and testing of products in accordance with specified standards.
  - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
  - 5. Perform additional tests and inspections required by Architect.
  - 6. Submit reports of all tests or inspections specified.
- B. Limits on Testing or 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. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.
- D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

### **3.12 CONTRACTOR DUTIES AND RESPONSIBILITIES**

- A. Contractor Responsibilities, General:
  - 1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
  - 2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
  - 3. Provide incidental labor and facilities:
    - a. To provide access to work to be tested or inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
    - c. To facilitate tests or inspections.
    - d. To provide storage and curing of test samples.
  - 4. Notify Architect and laboratory 48 hours prior to expected time for operations requiring testing or inspection services.

5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

**END OF SECTION**



**SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Dewatering
- B. Temporary utilities.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Project identification sign.
- I. Field offices.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 51 00 - Temporary Utilities.
- B. Section 01 52 13 - Field Offices and Sheds.
- C. Section 01 55 00 - Vehicular Access and Parking.
- D. Section 01 58 13 - Temporary Project Signage.

**1.03 DEWATERING**

- A. Provide temporary means and methods for dewatering all temporary facilities and controls.
- B. Maintain temporary facilities in operable condition.

**1.04 TEMPORARY UTILITIES - SEE SECTION 01 51 00**

- 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.
- B. Use trigger-operated nozzles for water hoses, to avoid waste of water.

**1.05 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

**1.06 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. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

**1.07 FENCING**

- A. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

**1.08 EXTERIOR ENCLOSURES**

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

**1.09 SECURITY**

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.

**1.10 VEHICULAR ACCESS AND PARKING - SEE SECTION 01 55 00**

**1.11 WASTE REMOVAL**

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.
- D. 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.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

**1.12 PROJECT SIGNS - SEE SECTION 01 58 13**

**1.13 FIELD OFFICES - SEE SECTION 01 52 13**

**1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. 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 specified condition.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 51 00 – TEMPORARY UTILITIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary Utilities: Provision of electricity and water.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 50 00 - Temporary Facilities and Controls:
  - 1. Temporary sanitary facilities required by law.

**1.03 REFERENCE STANDARDS**

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

**1.04 TEMPORARY ELECTRICITY**

- A. Cost: By Owner.
- B. Provide power service required from utility source.
- C. Power Service Characteristics: 120/208-volt, 125 ampere, three phase, four wire.
- D. Complement existing power service capacity and characteristics as required.
- E. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- F. Provide main service disconnect and over-current protection at convenient location and meter.
- G. Permanent convenience receptacles may not be utilized during construction.
- H. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

**1.05 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES**

- A. Provide and maintain LED, compact fluorescent, or high-intensity discharge lighting as suitable for the application for construction operations in accordance with requirements of 29 CFR 1926 and authorities having jurisdiction.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Maintain lighting and provide routine repairs.

**1.06 TEMPORARY HEATING**

- A. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
- B. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- C. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

**1.07 TEMPORARY COOLING**

- A. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
- B. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

- C. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

**1.08 TEMPORARY VENTILATION**

- A. Existing ventilation equipment may not be used.

**1.09 TEMPORARY WATER SERVICE**

- A. Cost of Water Used: By Owner.
- B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.
- C. Connect to existing water source.
  - 1. Exercise measures to conserve water.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 52 13 - FIELD OFFICES AND SHEDS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary field offices for use of Construction Manager, Owner, Project Inspector, and Architect.
- B. Temporary field offices for use of Contractor.
- C. Maintenance and removal.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 50 00 - Temporary Facilities and Controls:
  - 1. Temporary sanitary facilities required by law.
- B. Section 01 55 00: Parking and access to field offices.

**1.03 USE OF PERMANENT FACILITIES**

- A. When permanent facilities are enclosed with operable utilities, relocate offices into building, with written agreement of Owner, and remove temporary buildings.

**PART 2 PRODUCTS**

**2.01 MATERIALS, EQUIPMENT, FURNISHINGS**

**2.02 CONSTRUCTION**

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to temporary foundations, with steps and landings at entrance doors.
- B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during progress of Work; remove when no longer needed.
- C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy requirements.
- D. Exterior Materials: Weather resistant, finished in one color.
- E. Interior Materials in Offices: Sheet type materials for walls and ceilings, prefinished or painted; resilient floors and bases.
- F. Lighting for Offices: 50 fc at desk top height, exterior lighting at entrance doors.
- G. Fire Extinguishers: Appropriate type fire extinguisher at each office.

**2.03 ENVIRONMENTAL CONTROL**

- A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

**2.04 CONTRACTOR OFFICE AND FACILITIES**

- A. Size: For Contractor's needs and to provide space for project meetings.
- B. Furnishings in Meeting Area: Conference table and chairs to seat at least 12 persons; racks and files for Contract Documents, submittals, and project record documents.
- C. Other Furnishings: Contractor's option.
- D. Equipment: PPE (hard hats, safety glasses, and reflective vests) of various sizes for up to 6 visitors.

**2.05 CONSTRUCTION MANAGER OFFICE**

- A. Separate space for sole use of Construction Manager, Owner, Project Inspector, and Architect, with separate entrance door with new lock that is keyable by Owner.

- B. Area: At least 320 sf, with minimum dimension of 8 ft.
- C. Windows: At least three, with minimum total area equivalent to 10 percent of floor area, with an operable sash and insect screen. Locate to provide views of construction area.
- D. Electrical Distribution Panel: Four circuits minimum, 110 volt, 60 hz service.
- E. Sanitary Facilities: As specified in Section 01 50 00.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Fill and grade sites for temporary structures to provide drainage away from buildings.

**3.02 INSTALLATION**

- A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.
- B. Walkway: Hard surfaced walk from sidewalk at street to Field Offices and restroom facilities.
- C. Employee Residential Occupancy: Not allowed on Owner's property.

**3.03 MAINTENANCE AND CLEANING**

- A. Maintain approach walks free of mud, water, and snow.

**3.04 REMOVAL**

- A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

**END OF SECTION**

**SECTION 01 55 00 – VEHICULAR ACCESS AND PARKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Access roads.
- B. Parking.
- C. Existing pavements and parking areas.
- D. Permanent pavements and parking facilities.
- E. Construction parking controls.
- F. Flag persons.
- G. Flares and lights.
- H. Haul routes.
- I. Traffic signs and signals.
- J. Maintenance.
- K. Removal, repair.
- L. Mud from site vehicles.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 58 13 - Temporary Project Signage: Post Mounted and Wall Mounted Traffic Control and Informational Signs.
- B. Section 31 20 00 - Earthwork: Specifications for earthwork and paving bases.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Temporary Construction: Contractor's option.
- B. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

**2.02 SIGNS, SIGNALS, AND DEVICES**

- A. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in Section 01 58 13 - Temporary Project Signage.
- B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
- C. Flag Person Equipment: As required by local jurisdictions.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

**3.02 ACCESS ROADS**

- A. Tracked vehicles not allowed on paved areas.
- B. Construct new temporary access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.
- C. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.

- D. Location as approved by Construction Manager.
- E. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.
- F. Provide and maintain access to fire hydrants free of obstructions.

### **3.03 PARKING**

- A. Arrange for temporary parking areas to accommodate use of construction personnel.
- B. When site space is not adequate, provide additional off-site parking.
- C. Locate as approved by Construction Manager.

### **3.04 PERMANENT PAVEMENTS AND PARKING FACILITIES**

- A. Prior to Substantial Completion the base for permanent roads and parking areas may be used for construction traffic.
- B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

### **3.05 CONSTRUCTION PARKING CONTROL**

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
- B. Prevent parking on or adjacent to access roads or in non-designated areas.

### **3.06 FLAG PERSONS**

- A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

### **3.07 FLARES AND LIGHTS**

- A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

### **3.08 HAUL ROUTES**

- A. Confine construction traffic to designated haul routes.
- B. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

### **3.09 TRAFFIC SIGNS AND SIGNALS**

- A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
- B. Relocate as work progresses, to maintain effective traffic control.

### **3.10 MAINTENANCE**

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

### **3.11 REMOVAL, REPAIR**

- A. Repair existing and new permanent facilities damaged by use, to specified condition.
- B. Remove equipment and devices when no longer required.
- C. Repair damage caused by installation.



**3.12 MUD FROM SITE VEHICLES**

- A. Provide means of removing mud from vehicle wheels before entering streets.

**END OF SECTION**

**SECTION 01 60 00 – PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 RELATED REQUIREMENTS**

- A. General Conditions, Article 3, Part 3.10 – Substitutions and Section 01 25 00 – Substitution Procedures: Substitutions made during procurement and/or construction phases.
- B. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

**1.03 SUBMITTALS**

- A. 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.
- B. 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.
- C. 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.

**PART 2 PRODUCTS**

**2.01 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
  - 1. Containing lead, cadmium, or 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 SUBSTITUTION LIMITATIONS**

- A. See General Conditions, Part 3.10 – Substitutions and Section 01 25 00.

**3.02 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on 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.

**3.03 STORAGE AND PROTECTION**

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. 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. See Section 01 74 19.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.
- G. Provide off-site storage and protection when site does not permit on-site storage or protection.
- H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- I. Comply with manufacturer's warranty conditions, if any.
- J. Do not store products directly on the ground.
- K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- L. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- M. Prevent contact with material that may cause corrosion, discoloration, or staining.
- N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- O. 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**

**SECTION 01 64 00 - OWNER-FURNISHED PRODUCTS**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Materials and Equipment.

**1.02 SECTION INCLUDES:**

- A. Requirements for the following:
  - (1) Installing Owner-furnished materials and equipment.
  - (2) Providing necessary utilities, connections and rough-ins.

**1.03 DEFINITIONS**

- A. Owner: District, who is providing/furnishing materials and equipment.
- B. Installing Contactor or Installer/Contractor: Contractor, who is installing the materials and equipment furnished by the Owner.

**1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING:**

- A. Receive, store and handle products in accordance with the manufacturer's instructions.
- B. Protect equipment items as required to prevent damage during storage and construction.

**PART 2 – PRODUCTS**

**2.01 GENERAL PRODUCT REQUIREMENTS:**

- A. Installer Contractor's Responsibilities:
  - (1) Verify mounting and utility requirements for Owner-furnished materials and equipment items.
  - (2) Provide mounting and utility rough in for all items where required.
    - (a) Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.
- B. Owner and Installer Contractor(s) Responsibilities:
  - (1) Owner-Furnished/Contractor Installed ("OFCl"): Furnished by the Owner; installed by the Installer Contractor.
    - (a) General: Owner and Installer Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.
    - (b) Owner will furnish specified materials and equipment delivered to the site. Owner/vendor's representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 43 00, Materials and Equipment, Article 1.04.
    - (c) The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installer Contractor.
    - (d) The Installer Contractor shall:

- 1) Review, verify and accept the approved manufacturer's submittal/Shop Drawings for all materials and equipment required to be installed by the Installer Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.
  - 2) Coordinate timely delivery. Installer Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installer Contractor shall assume responsibility for such defects and omissions.
  - 3) Store materials and equipment until ready for installation and protect from loss and damage. Installer Contractor is responsible for providing adequate storage space.
  - 4) Coordinate with other bid package contractors and field measurement to ensure complete installation.
  - 5) Uncrate, assemble, and set in place.
  - 6) Provide adequate supports.
  - 7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and Shop Drawings, supply labor and material required, and make mechanical, plumbing, and electrical connections required to operate equipment.
  - 8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.
  - 9) Provide anchorage and/or seismic bracing as shown on the approved drawings. If not shown, they shall be anchored and/or seismically braced per the requirements of the 2019 California Building Code, CCR Title 24 and all other applicable codes.
  - 10) Provide the contract-required warranty and guarantee for all work, materials and equipment, and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.
- C. Compatibility with Space and Service Requirements:
- (1) Equipment items shall be compatible with space limitations indicated and as shown on the Contract Documents and specified in other sections of the Specifications.
  - (2) Modifications to equipment items required to conform to space limitations specified for rough in shall not cause additional cost to the District.
- D. Manufacturer's printed descriptions, specifications, and instructions shall govern the Work unless specifically indicated or specified otherwise.
- 2.02 FURNISHED MATERIALS AND EQUIPMENT**
- A. All furnished materials and equipment are indicated or scheduled on the Contract Documents.

**PART 3 – EXECUTION**

**3.01 INSTALLATION**

- A. Install equipment items in accordance with the manufacturer's instructions.
- B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.
- C. Make electrical and mechanical connections as indicated and required.
- D. Touch-up and restore damaged or defaced finishes to the District's satisfaction.

**3.02 CLEANING AND PROTECTION**

- A. Repair or replace items not acceptable to the Architect or District.
- B. Upon completion of installation, clean equipment items in accordance with manufacturer's recommendations, and protect from damage until final acceptance of the Work by the District.

END OF SECTION

**SECTION 01 70 00 – EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Cutting and patching.
- C. Surveying for laying out the work.
- D. Cleaning and protection.
- E. Starting of systems and equipment.
- F. Demonstration and instruction of Owner personnel.
- G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

**1.02 RELATED REQUIREMENTS**

- A. General Conditions, Article 3, Parts 3.7 and 3.9: Submittals required at the Commencement of the Project and Submittals Including Shop Drawings, Product Data and Samples.
- B. General Conditions, Article 13, Part 13.5: Testing and Inspections.

**1.03 QUALIFICATIONS**

- A. For surveying 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. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
- 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. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

**1.04 PROJECT CONDITIONS**

- A. 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.
- B. 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.
- C. 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.

**1.05 COORDINATION**

- A. 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.
- B. Notify affected utility companies and comply with their requirements.
- C. 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.

- D. 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.
- E. Coordinate completion and clean-up of work of separate sections.
- F. 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 LAYING OUT THE WORK**

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.



- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. 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; and equipment pads.
  - 2. Grid or axis for structures.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

#### **3.04 GENERAL INSTALLATION REQUIREMENTS**

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as 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.

#### **3.05 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-complying 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. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- E. Restore work with new products in accordance with requirements of Contract Documents.
- F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. 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.

### **3.06 PROGRESS CLEANING**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- 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 periodically and dispose off-site; do not burn or bury.

### **3.07 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. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.08 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and Owner seven days prior to start-up of each item.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.09 DEMONSTRATION AND INSTRUCTION**

- A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

**3.10 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

**3.11 FINAL CLEANING**

- A. Use cleaning materials that are nonhazardous.
- B. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Clean site; sweep paved areas, rake clean landscaped surfaces.
- E. 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. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. 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 Substantial Completion inspection.
- E. 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.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

**END OF SECTION**

**SECTION 01 71 23 - FIELD ENGINEERING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;
- B. Special Conditions;
- C. Site-Visit Certification.

**1.02 REQUIREMENTS INCLUDED:**

- A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:
  - (1) Survey work required in execution of the Project.
  - (2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

**1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:**

Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

**1.04 SURVEY REFERENCE POINTS:**

- A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.
- B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:
  - (1) Make no changes or relocation without prior written notice to District and Architect.
  - (2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
  - (3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

**1.05 RECORDS:**

Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

**1.06 SUBMITTALS:**

- A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.
- B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.
- C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

**PART 2 – PRODUCTS** Not Used.

**PART 3 - EXECUTION**

**3.01 COMPLIANCE WITH LAWS:**

Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

**3.02 NONCONFORMING WORK:**

Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF SECTION

**SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT & DISPOSAL**

**PART 1 GENERAL**

**1.01 WASTE MANAGEMENT REQUIREMENTS**

- A. Owner requires that this project generate the least amount of trash and waste possible.
- 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. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- E. 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.
- F. 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.

**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 including 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 a waste material from the project site to another site for remanufacture 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 a construction waste material in some manner on the project site.
- K. Salvage: To remove a 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 General Conditions, Article 3, Parts 3.7 and 3.9 – Submittals Requires at the Commencement of the Project and Submittals Including Shop Drawings, Product Data and Samples, for submittal procedures.
- B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
  - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
  - 2. Submit Report on a form acceptable to Owner.
  - 3. Landfill Disposal: Include the following information:
    - a. Identification of material.
    - b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project disposed of in landfills.
    - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
  - 4. Incinerator Disposal: Include the following information:
    - a. Identification of material.
    - b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project delivered to incinerators.
    - c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
  - 5. Recycled and Salvaged Materials: Include the following information for each:
    - a. Identification of material, including those retrieved by installer for use on other projects.
    - b. Amount, in tons or cubic yards (cubic meters), date removed from the project site, and receiving party.
    - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
    - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
  - 6. Material Reused on Project: Include the following information for each:
    - a. Identification of material and how it was used in the project.
    - b. Amount, in tons or cubic yards (cubic meters).
    - c. Include weight tickets as evidence of quantity.

7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

## **PART 2 PRODUCTS**

### **2.01 PRODUCT SUBSTITUTIONS**

- A. See Section 01 60 00 - Product Requirements for substitution submission procedures.
- B. For each proposed product substitution, submit the following information in addition to requirements specified in General Conditions, Article 3, Part 3.10: Substitutions.
  1. Relative amount of waste produced, compared to specified product.
  2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Price.
  3. Proposed disposal method for waste product.
  4. Markets for recycled waste product.

## **PART 3 EXECUTION**

### **3.01 WASTE MANAGEMENT PROCEDURES**

- A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

### **3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION**

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
  1. Prebid meeting.
  2. Preconstruction meeting.
  3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
  1. Provide containers as required.
  2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
  3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of



identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

**END OF SECTION**

**SECTION 01 78 00 – CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

**1.03 SUBMITTALS**

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  - 2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
  - 3. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed shop drawings, product data, and samples.

6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  1. Manufacturer's name and product model and number.
  2. Product substitutions or alternates utilized.
  3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  3. Field changes of dimension and detail.
  4. Details not on original Contract drawings.

### **3.02 OPERATION AND MAINTENANCE DATA**

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

### **3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
  1. Product data, with catalog number, size, composition, and color and texture designations.
  2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### 3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
  - 1. Description of unit or system, and component parts.
  - 2. Identify function, normal operating characteristics, and limiting conditions.
  - 3. Include performance curves, with engineering data and tests.
  - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
  - 1. Include HVAC outdoor and exhaust air damper calibration strategy.
    - a. Include provisions which ensure that full closure of dampers can be achieved.
  - 2. Include Carbon Dioxide Monitoring Protocol.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide control diagrams by controls manufacturer as installed.
- L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- N. Include test and balancing reports.

### 3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 20-pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
  - 1. Project Directory.
  - 2. Table of Contents, of all volumes, and of this volume.
  - 3. Operation and Maintenance Data: Arranged by system, then by product category.
    - a. Source data.
    - b. Product data, shop drawings, and other submittals.
    - c. Operation and maintenance data.
    - d. Field quality control data.
    - e. Photocopies of warranties and bonds.

### **3.06 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

**END OF SECTION**

**SECTION 01 79 00 - DEMONSTRATION AND TRAINING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Demonstration and training video recordings.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For facilitator, instructor, and videographer.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

**1.4 CLOSEOUT SUBMITTALS**

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
  - 1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Name and address of videographer.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Date of video recording.
  - 2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.

3. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

#### 1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

#### 1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

### PART 2 - PRODUCTS

#### 2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  2. Documentation: Review the following items in detail:
    - a. Emergency manuals.

- b. Operations manuals.
  - c. Maintenance manuals.
  - d. Project record documents.
  - e. Identification systems.
  - f. Warranties and bonds.
  - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
  - a. Instructions on meaning of warnings, trouble indications, and error messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of normal operating limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
  - a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:



- a. Diagnosis instructions.
- b. Repair instructions.
- c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

#### **3.2 INSTRUCTION**

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  1. Owner will furnish an instructor to describe Owner's operational philosophy.
  2. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  1. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

#### **3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS**

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
  1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video: Provide minimum 640 x 480 video resolution converted to.mp4 format file type, on electronic media.

1. Electronic Media: Thumb Drive acceptable to Owner.
  2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
  3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
  4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training video that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
    - a. Name of Contractor/Installer.
    - b. Business address.
    - c. Business phone number.
    - d. Point of contact.
    - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
1. Film training session(s) in segments not to exceed 15 minutes.
    - a. Produce segments to present a single significant piece of equipment per segment.
    - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
    - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Pre-produced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

**END OF SECTION 01 79 00**

**SECTION 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS**

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Duties of Contractor
- B. Duties of Commissioning Authority
- C. Commissioning Plan
- D. Commissioning Electronic Folder
- E. Systems to be Commissioned
- F. Acceptance Procedures
- G. Performance Period
- H. Training and Instruction

1.02 TERMS

- A. Commissioning Plan: The preliminary Commissioning Plan has been prepared by the Owner's Commissioning Authority (CA), and shall be implemented by the Contractor and CA together. The commissioning plan (included) outlines the organization, scheduling, documentation, etc., pertaining to the overall commissioning process. A final plan shall be prepared after Contract Award as described below.
- B. Functional Performance Testing: That full range of checks and tests carried out to determine if all components, sub-systems, systems, and interfaces between systems function in accordance with the contract documents. In this context, "function" includes all modes and sequences of control operation, all interlocks and conditional control responses, and all specified responses to abnormal emergency conditions.
- C. Acceptable Performance: A component or system being able to meet specified design parameters under actual load including satisfactory documented completion of all functional performance tests, control system trending and resolution of outstanding issues.
- D. Commissioning: The process to assure the Owner that mechanical and electrical equipment, controls, and systems function together properly to meet performance requirements and design intent as shown in a composite manner in the Contract Documents.

1.03 DUTIES OF CONTRACTOR

- A. Collect the subcontractor and/or supplier information requested by Commissioning Authority for development of a complete Commissioning Plan, Commissioning Online Folder, and Functional Tests and provide to the Commissioning Authority. The Contractor and appropriate subcontractors shall review these documents and confirm in writing to the Owner, Architect, and Commissioning Authority any known areas of conflict or areas requiring clarification.
- B. Collect all proposed start-up and Prefunctional documentation from appropriate sub-contractors and provide that information to the Commissioning Authority. The Commissioning Authority will incorporate that information into the Commissioning Online Folder. The Commissioning Authority will provide the Contractor with the Commissioning Online Folder/Binder

- C. The Commissioning Online Folder will be stored in the Contractors field trailer and will be managed by the Contractor. The contractor shall confirm in writing to the Commissioning Authority that systems are complete, functional and the appropriate subcontractors have completed the specified tasks and signed off all pre-function startup checklist documentation.
- D. Coordinate directly with subcontractors on their specific responsibilities and contractual obligation.
- E. Coordinate the required Architect, Commissioning Authority, and Owner testing participation and approval procedures, after verifying that start-up and pretests have been satisfactorily conducted and final tests are ready to be performed.
- F. Review Operating and Maintenance Data provided by the various subcontractors and suppliers for verification, organization, distribution, and conformance to requirement of Contract Documents.

#### 1.04 DUTIES OF COMMISSIONING AUTHORITY

- A. The Owner will contract directly with a Commissioning Authority to direct the commissioning process through appropriate contract channels, perform functional test and recommend project completion from the commissioning perspective.
- B. The duties of the Commissioning Authority are:
  - 1. Develop the Commissioning Plan.
  - 2. Develop Functional Test Procedures from final Control documentation including narrative sequences of operation, control diagrams and software code, for execution with the assistance of Contractor staff as required.
  - 3. Develop the Commissioning Online Folder with appropriate documentation provided from Contractor. Provide supplemental documentation as necessary to ensure that all aspects of start-up and testing have been complete and documented prior to functional testing.
  - 4. Witness and verify satisfactory completion of equipment and component tests and systems and inter-systems functional performance tests.
  - 5. Provide site observation, Functional test or other project reports in a timely manner. Document inconsistencies or deficiencies in system operations and system compliance. System deficiencies shall be forwarded to the Owners Rep and tracked with normal punchlisting activities.
  - 6. Review contractor schedules for start-up and functional testing. This is to be coordinated with any required building purge or owner occupancy schedules required by the Owner.
  - 7. Review Testing Adjusting and Balancing (TAB) reports and witness and direct TAB in verification effort.
  - 8. Coordinate via the Construction Manager participation of Owner's personnel involved with equipment, component and systems performance verification and participation in required training.

9. When commissioning has been successfully completed, recommend acceptance to the Owner.
  10. Verify that appropriate Operation and Maintenance Manuals and Project redline drawings have been provided by various subcontractors.
  11. Once all functional tests have been successfully completed and all outstanding issues resolved the Commissioning Authority will provide the owner with a final report of all commissioning activities that occurred during the project.
- C. The Commissioning Authority will formally communicate with the Contractor via approved project channels. It is expected, however, that informal communication and coordination will be conducted directly with the subcontractors, records of all contacts will be sent to the Architect through the normal channels.
- D. The Commissioning Authority is not authorized to modify, add to or revoke the requirements of the Contract Document. A change in the Work can only be made as provided in the General Conditions.

#### **1.05 PRELIMINARY COMMISSIONING PLAN**

- A. This Preliminary Plan, details the implementation of the commissioning process. It includes the requirements that each party involved in the commissioning process will have to accomplish, including sequence, scheduling, documentation requirements, verification procedures, etc.
- B. Commissioning Activities:
1. The Commissioning Schedule. This schedule defines the milestones and conditions that must be achieved before system testing and other commissioning activities can commence. The schedule also includes the expected duration of the various tasks, so that the commissioning process can be incorporated into the overall construction schedule.
  2. Preparation for Testing. To prepare for the system performance testing, the Commissioning Authority will examine the design and construction documents, develop with appropriate contractors Pre-functional Test Checklists of construction responsibilities that must be completed prior to testing, and develop detailed Functional Test Procedures and data forms. Using the Pre-functional Test Checklists, each subcontractor must verify that the systems they install are in compliance with the construction documents and are fully functional. Commissioning is not intended to be a testing or inspection function that replaces any of the Contractors' obligations for testing and proof of performance. Functional testing will only begin when checklists are completed by the appropriate subcontractors, initialed, signed, and returned to the Commissioning Authority accompanied with a written letter from the Contractor indicating specific system completion.
  3. Functional Testing. Functional testing is performed by the Commissioning Authority with the assistance of the Contractor to verify proper sequencing, operation and performance of installed equipment and systems under realistic operating conditions. As tests are successfully completed, a functional test checklist will be used to document the testing progress.
  4. Documentation. In addition to the Pre-functional Test Checklists and Functional Test Procedures, written documentation will be maintained for all other commissioning activities. Project communication reports shall be issued by the Commissioning Authority to the Contractor and key members of the commissioning team to document apparent deficiencies identified during examination of design and construction documents, daily activities on-site, construction deficiencies, and successful or unsuccessful functional testing results. At the end of the commissioning process, all documentation will be assembled and summarized in the final commissioning report.
  5. Commissioning Electronic Folder: The Commissioning Electronic Folder will be created by the Commissioning Authority and used by the contractors to identify and track all pertinent commissioning documentation required during the installation start-up and check-out phases. This Electronic Folder will be maintained by the Contractor on site and will be made available to all

subcontractors for their use. The Electronic Folder provides a central location for the subcontractors and Commissioning Authority to identify, copy and organize all pertinent information.

6. Problem Resolution. When a project communication report is issued to address an identified deficiency, the Contractor shall forward the reports to the appropriate parties to initiate corrective action in an expeditious manner. Deficiencies will be tracked as part of the punch listing activity.

C. Commissioning Roles and Responsibilities

1. The responsibilities for commissioning are divided between the Architect; the General Contractor and its Subcontractors; and the Commissioning Authority as follows:

a. General Contractor

- 1) Identify, coordinate, and incorporate commissioning activities with the Commissioning Authority and integrate into the general construction schedule.
- 2) Coordinate participation of the Mechanical, Electrical, Controls and TAB Contractors in the commissioning process.
- 3) Identify and coordinate delivery, start-up and related commissioning activities with vendors and manufacturer's representatives as required. Confirm accurate delivery of equipment upon receipt and forward all related manufacturer's documentation to Commissioning Authority.
- 4) Forward appropriate copies of submittals, operation and maintenance manuals, and as-built drawings to the Commissioning Authority.
- 5) Review the Commissioning Plan, project communication reports, and test results, and submit comments to the Commissioning Authority.
- 6) In a timely manner, address issues identified during construction that may affect the commissioning process or final system performance.
- 7) Conduct and provide minutes for regular commissioning meetings as determined appropriate with Owner's Representative and Commissioning Authority.
- 8) Issue written Notice of Readiness for each system identified in part 1.07 below to Commissioning Authority upon completion of all systems work, start-up and pre-functional test documentation requirements by trade contractors.

b. Mechanical Contractor

- 1) Coordinate participation of the mechanical subcontractors in the commissioning process.
- 2) Coordinate installation of mechanical systems and equipment with equipment suppliers, mechanical subcontractors, and electrical contractor. Verify that coordination, installation, quality control, and final subcontractor testing have been completed such that installed systems and equipment comply with construction documents.
- 3) Notify the Construction Manager, General Contractor and Commissioning Authority as soon as possible of any issues identified during construction that may affect the commissioning process or final system performance.
- 4) Provide proposed installation, start-up and pre-functional testing documentation for equipment noted in 1.07 below to Commissioning Authority for review within 90 days of Notice to Proceed.
- 5) Perform start-up and testing of mechanical equipment and systems and document as required with start-up reports and completion of Pre-functional Test Checklists. Reports will be stored in the General Contractors field trailer.

- 6) Lead verification testing of Fire/Smoke dampers and direct appropriate subcontractors in the resolution of deficiencies. Each damper and all functions of shall be tracked in a matrix-spread sheet.
  - 7) Operate equipment and systems as required for functional performance testing.
  - 8) Participate in the fine-tuning or troubleshooting of system performance if either of these measures becomes necessary.
  - 9) Submit complete operation and maintenance information and as-built drawings to the general contractor for verification, organization, and distribution.
  - 10) Provide training for the systems specified.
  - 11) The installing contractor shall provide (complete and signed) all required "Acceptance Testing" form per 2022 California Title-24 Energy Code.
- c. Electrical Contractor
- 1) Coordinate installation of electrical systems and equipment with equipment suppliers, electrical subcontractors, and mechanical contractor. Verify that coordination, installation, quality control, and final subcontractor testing have been completed such that installed systems and equipment comply with construction documents.
  - 2) Notify the Construction Manager, General Contractor and Commissioning Authority immediately of any issues identified during construction that may affect the commissioning process or final system performance.
  - 3) Provide proposed installation, start-up and testing documentation to be used for the required systems noted in the specifications and summarized in part 1.07 below to Commissioning Authority for review within 90 days of Notice to Proceed.
  - 4) Perform start-up and testing of electrical equipment and systems and document with start-up reports and completion of Pre-functional Test. Reports will be stored in the General Contractors field trailer.
  - 5) Operate equipment and systems as required for functional performance testing.
  - 6) Participate in fine-tuning or troubleshooting of system performance if either of these measures becomes necessary.
  - 7) Provide complete operation and maintenance information and as-built drawings to the general contractor for verification, organization, and distribution.
  - 8) Provide training for the systems specified.
  - 9) The installing contractor shall provide (complete and signed) all required "Acceptance Testing" form per 2022 California Title-24 Energy Code.
- d. Controls Contractor (or Mechanical Contractor representative for distributed control components)
- 1) Provide Commissioning Authority and Mechanical Contractor with controls system and wiring diagrams and narrative sequences of operation, approved by the Mechanical design consultant, in time for use in preparing the Functional Test Procedures.
  - 2) Review the Commissioning Plan, schedule, and Functional Test Procedures. Provide input required to develop final plans and procedures as a fair means of compliance with commissioning goals and the project contract.
  - 3) Participate in efforts to finalize sequences of operations with Owner, Designers, and Commissioning Authority.
  - 4) Coordinate installation of controls system with equipment suppliers, mechanical subcontractors, and electrical contractor. Verify that coordination, installation, quality

- control, and final subcontractor testing have been completed such that installed systems and equipment comply with construction documents.
- 5) Notify the Commissioning Authority, Designers and Construction Manager as soon as possible of any system installation issues identified during construction that may compromise system control capability.
  - 6) Participate in start-up and functional testing as required. This will require dedicated, full-time support of the Commissioning Authority's functional testing efforts during commissioning.
  - 7) Provide proposed installation, start-up and testing documentation to be used for the required systems noted in the specifications and summarized in part 1.07 below to Commissioning Authority for review within 90 days of Notice to Proceed.
  - 8) Complete Pre-functional Test Checklists and other supporting documentation as required demonstrating completion of control system installation, point-to-point verification (including sensor calibration), start-up and testing prior to the initiation of functional testing. Reports will be stored in the General Contractors field trailer.
  - 9) Support the Commissioning Authority in functional testing of each of the systems. The Controls Contractor shall manipulate the controls systems to achieve the expected response for the functional test procedure.
  - 10) Participate in fine-tuning or troubleshooting of system performance if either of these measures becomes necessary.
  - 11) Provide the Commissioning Authority and Construction Manager with final documentation for all installed conditions, including as-built drawings and detailed narrative sequences of operation as determined during commissioning process.
  - 12) Coordinate activities as necessary with Test, Adjust and Balance Contractor as required for determining appropriate equipment and device locations, identifying and recording various set points and calibration values, and documenting same to Commissioning Authority.
- e. Test, Adjust, and Balance Contractor
- 1) Review the Commissioning Plan, schedule, and Functional Test Procedures. Provide the input required to develop final plans and procedures.
  - 2) Provide a Contract Documents Examination report indicating a review of Drawings, Specifications, Issues, Field Notices and A/E reviewed submittals. Verify that piping, instruments, wells, taps, valves, ductwork, duct specialties, dampers, flow measuring elements, access openings and other accessories; have been provided in correct quantity and at correct locations to permit balancing of piping and air systems under testing and operating conditions.
  - 3) Coordinate balancing activities with those of the Mechanical and Controls contractors. Verify that coordination, installation, quality control, and final subcontractor testing have been completed to allow proper balancing work to be performed.
  - 4) Notify the Commissioning Authority, Designers and Construction Manager as soon as possible of any system installation or performance issues that may compromise the ability of the system to be balanced.
  - 5) Participate in start-up and testing as required.
  - 6) Complete appropriate portions of mechanical, electrical and TAB Pre-functional Test Checklists to verify completion of system balancing tasks. Reports will be stored in the General Contractors field trailer.
  - 7) Organize and run a Pre-Balance Conference one week prior to commencement of balance work. At this juncture, all Contractors are to provide a comprehensive list of any outstanding



design, installation or performance deficiencies which may impede TAB or functional testing activities. This will address those items not already resolved during installation verification and pre-functional testing deficiency tracking process.

- 8) Provide preliminary TAB report, indicating all actual field values recorded, to the Commissioning Authority, prior to initiation of functional testing. These reports shall be incorporated in the Commissioning Online Folder
- 9) Participate in fine-tuning or troubleshooting of system performance if either of these measures becomes necessary.

f. Commissioning Authority

- 1) Perform commissioning submittal review to verify suitability and compliance with specifications.
- 2) Revise the Commissioning Plan as necessary to incorporate post-award conditions.
- 3) Provide supplemental Pre-Functional Test documentation forms for all equipment to be commissioned with coordination of subcontractor's specified documentation. Documentation will be coordinated by the Commissioning Authority and installed in a Commissioning Electronic Folder. The Electronic Folder will be created by the Commissioning Authority and maintained and managed the by General Contractor.
- 4) Organize meetings to finalize the controls system I/O Points List and Sequences of Operation as needed. The meeting will be supported by the Owner's Representative, Designer and Controls Contractor.
- 5) Write Functional Test Procedures and transmit to subcontractors for review. After review period changes will be incorporated and test will be performed.
- 6) Perform site observations to follow installation progress, and to verify system installation quality and readiness for testing.
- 7) Observe the start-up activities and initial testing of equipment and systems as required, and review contractor start-up documentation. Verify that the specified training schedule of Owner's personnel is provided.
- 8) Review submittal of all required Pre-functional and start-up documentation provided by contractors for completeness and reasonableness. This includes Controls Subcontractor's point to point checklists and TAB Subcontractor's completed preliminary TAB report prior to initiation of functional testing.
- 9) Direct and perform functional test with assistance from subcontractors as required.
- 10) Issue project communication reports as necessary to document activities, progress, and deficiencies.
- 11) Assemble all test results and other required documentation into the final commissioning report.

D. The functional test procedures include, but are not limited to, the following:

1. Verification of Testing, adjusting and balancing performance;
2. Verification of all equipment performance;
3. Verification of the performance of subsystems consisting of combinations of equipment (i.e. refrigeration cycle, pumps, chillers, cooling towers, and interconnecting piping);
4. Verification of the performance of the automatic controls in all seasonal modes;
5. Verification of the performance of the HVAC system as a whole;
6. Verification of the performance of all life safety devices and systems as the interface with the HVAC systems.

7. Verification of third-party testing and documentation review.

#### 1.06 COMMISSIONING ELECTRONIC FOLDER

- A. The Commissioning Electronic Folder will be assembled by the Commissioning Authority and use by the contractors to identify and track all pertinent commissioning documentation. This Electronic Folder will be maintained by the Construction Manager on site and will be made available to all subcontractors for their use. The Electronic Folder provides a central location for the Commissioning Authority to identify, copy and organize all pertinent information and will include the following format:
  1. Summary describing Electronic Folder contents and use.
  2. Copy of Commissioning Plan for contractor field reference.
  3. Listing of all specification documentation requirements listed by specification section, with construction completion sign offs for appropriate parties.
- B. Tabs for each specification section with copies of pre-functional test check sheets provided by coordination of subcontractors and Commissioning Authority for contractor completion and space for related contractor-supplied documents.

#### 1.07 CALIFORNIA TITLE-24 COMMISSIONING SCOPE:

- A. Per 2022 California Energy Code Part 6, Title 24/CalGreen requirements, LP Engineers will coordinate and lead, review and oversee the completion of the following commissioning process activities:
  1. Design Review:
    - a. Schematic Design Phase: meet with design team to discuss project scope, schedule and how the team will coordinate. The design team shall review the "Design Review Checklist" form NRCC-CXR-02-E. Form NRCC-CXR-01-E shall be provided to document the Design Review Kickoff.
    - b. Construction Documents Design Review: The construction documents shall be reviewed in accordance with CEC Section 120.8 (d). The design review forms NRCC-CX-02-E, NRCC-CX-03-E, NRCC-CX-04-E and NRCC-CX-05-E shall be completed as applicable.
  2. The Owner will document the Owner's project requirements. The design team will document the basis of design for the Project. The Owner and the design team shall make updates to these documents during design and construction. LP Engineers will facilitate this process and review the documents for clarity and completeness.
  3. LP Engineers will develop and incorporate commissioning requirements into the construction documents specifications.
  4. LP Engineers will develop and utilize a commissioning plan that will be used throughout the commissioning process.
  5. LP Engineers will verify that the installation and performance of energy consuming systems meet the Owner's project requirements and basis of design.
    - a. Conduct Commissioning Meetings as deemed necessary by the CxA with the construction team throughout the duration of the project to review progress to date, any commissioning issues, documentation and reporting.
    - b. Conduct Commissioning Site Observations throughout the duration of the project as deemed necessary by the CxA. Construction progress and installation will be reviewed and a Site Observation Report submitted after each visit.
  6. Review installing contractor provided "Acceptance Test" checklists to confirm that individual components of a system are installed properly per California Title-24.
  7. Contractor Submittal Review:

- a. Review contractor submittals applicable to systems being commissioned.
8. Develop Functional Testing Procedures to be carried out by the contractors, witness and record the results. The Functional Test Results will be evaluated to confirm that the commissioned systems are functioning in accordance with the Owner's Project Requirements and the Basis of Design.
9. System Manual:
  - a. Develop a system manual that provides future operating staff the information needed to understand and optimally operate the commissioned systems.
10. Operating Personnel Training:
  - a. Verify that the requirements for training operating personnel and building occupants are completed.
11. Exclusions: LP Engineers will not provide the "Acceptance Testing Forms" (Envelope, Mechanical, Plumbing, Process and Electrical). The installing contractor shall provide (complete and sign) all required "Acceptance Testing" forms per 2022 California Title-24 Energy Code.
12. LP Engineers will complete a Commissioning Report which will include at a minimum:
  - a. An Executive Summary with results of the Commissioning Process including observations, conclusions and any outstanding items.
  - b. A Commissioning Issue Log identifying deficiencies discovered during the commissioning process, how they were resolved and any seasonal testing scheduled for a later date.
  - c. System performance test results including the Start-up Pre-functional Checklists and Functional Test Results.

## **PART 2 - PRODUCTS**

### **2.01 NOT USED**

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Operating equipment and systems shall be tested in presence of Owner's Commissioning Authority and Architect to demonstrate compliance with specified requirements.
  1. Notify Owner, in writing, seven (7) days prior to tests scheduled under requirements of this Section.
  2. Testing shall be conducted under specified design operating conditions as recommended or approved by Owner and Architect.
- B. Functional Performance Testing shall be completed and accepted by Owner as a condition of Final Completion.
- C. All elements of systems shall be tested to demonstrate that total systems satisfy all requirements of these Specifications. Testing shall be accomplished on hierarchical basis. Test each piece of equipment for proper operation, followed by each subsystem, followed by entire system, followed by entireties to other major systems.
- D. All special testing materials and equipment shall be provided by Contractor.
- E. Acceptance Documentation. A copy of the Commissioning Plan and Functional Performance test results shall be included with each copy of the Operations and Maintenance Manuals.

### 3.02 ACCEPTANCE PROCEDURES

- A. Prior to functional performance testing of each system, the Commissioning Authority shall observe and verify that the physical installation of components and systems being tested is substantially installed in accordance with the contract documents.
- B. Contractor's Tests:
  - 1. System shall be checked for proper installation, shall be adjusted, and shall be calibrated to verify that it is ready to function as specified.
  - 2. All system elements shall be checked to verify that they have been installed properly and that all connections have been made correctly.
  - 3. All discrete elements and sub-systems shall be adjusted and shall be checked for proper operation.
  - 4. Start-up and Operational Tests shall be complete, with all required pre-functional testing documentation included in the Field Commissioning Electronic Folder submitted for review by Commissioning Authority within five (5) days of each activity, prior to starting Functional Acceptance Tests.
- C. Owner-Witnessed Functional Tests:
  - 1. Objective of these tests is to demonstrate that system is operating and complying with specified performance requirements.
  - 2. Owner-witnessed Functional Performance Tests shall be performed on complete system. Each function shall be demonstrated to satisfaction of Architect and Owner's Commissioning Authority on paragraph-by-paragraph basis of Commissioning Authority's written test procedure, developed to demonstrate conformance to requirements of Contract Specifications.
  - 3. Functional Performance Test shall be witnessed and signed off by Commissioning Authority upon satisfactory completion.
  - 4. Actual testing program shall be conducted in accordance with prior approved procedures and shall be documented as required herein.
  - 5. Contractor shall notify Architect and Owner at least two weeks prior to date of Functional Performance Tests.
- D. The functional performance testing process shall be accomplished for all equipment, subsystems, systems, and system interfaces. All must be tested for acceptances, and there shall be a separate checklist for each to ensure documentation specific to each is complete.
- E. Each system shall be operated through all modes of system operation (for example, seasonal, occupied, unoccupied, warm-up, cool-down, etc, as applicable) including every individual interlock and conditional control logic, all control sequences, both full-load and part-load conditions, and simulation of all abnormal conditions for which there is a specified system or controls response.
- F. Temporary upsets of systems, such as distribution fault, control loss, setpoint change, equilibrium upset, and component failure, shall be imposed at different operation loads to determine system stability and recovery time.
- G. When the functional performance of all individual systems has been proven, the interface or coordinated responses between systems shall be checked. The systems involved may be within the overall HVAC work, or they may involve other systems, such as emergency systems for life safety.
- H. Corrective Measures: If acceptable performance cannot be achieved, then necessary corrective measures shall be carried out by the Contractor. Every check or test for which acceptable performance was not achieved shall be repeated after the necessary corrective measures have been completed. This re-testing process should be repeated until acceptable performance is achieved. The Contractor

will be allowed one retest after initial testing of the equipment. If the retest fails the contractor shall be financially responsible, at standard rates, to reimburse the owner representatives for the additional time taken to achieve acceptable performance.

**3.03 TRAINING AND INSTRUCTION**

- A. Training and instruction of Owner personnel is a part of the commissioning process and essential for the proper operation of the facility. The Contractor shall coordinate commissioning activities with training of Owner personnel. Detailed requirements for training and instruction are contained in other sections of the Contract Documents including, but not limited to, Divisions 22, 23, and Division 26.

END OF SECTION

**SECTION 02 41 16 - STRUCTURE DEMOLITION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings and site improvements.
2. Removing below-grade construction.
3. Disconnecting, capping or sealing, and removing site utilities.
4. Salvage of existing items for the owner, reuse in the project or for recycling.

B. Related Sections:

1. Section 01 50 13 "Construction Waste Management and Disposal" for documenting salvage, recycling, and disposal of nonhazardous demolition and construction waste.
2. Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.
- B. Remove and Recycle for the Benefit of the Owner: Carefully detach from existing construction, in a manner to prevent damage, and deliver to a recycling center.
- C. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.
- D. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and install where indicated.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified refrigerant recovery technician.
- B. Proposed Protection Measures: Submit informational report, including Drawings, that indicates the measures proposed for protecting individuals and property. Indicate proposed locations and construction of barriers.
  1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain.

- C. Schedule of Building Demolition Activities: Indicate the following:
  - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
  - 2. Temporary interruption of utility services.
  - 3. Shutoff and capping or re-routing of utility services.
- D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by demolition operations. Submit before the Work begins.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and recycled for the benefit of the owner along with a check made out to the School District from the Waste Management Company(ies) for the recycling value received for items removed and recycled.

#### 1.7 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.
- D. Predemolition Conference: Conduct conference at Project site.
  - 1. Inspect and discuss condition of construction to be demolished.
  - 2. Review structural load limitations of existing structures.
  - 3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review and finalize protection requirements.
  - 5. Review procedures for noise control and dust control.
  - 6. Review procedures for protection of adjacent buildings.
  - 7. Review items to be salvaged and returned to Owner.

#### 1.8 PROJECT CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
  - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.

2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
  - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- C. Owner assumes no responsibility for buildings and structures to be demolished.
  1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
  2. Before building demolition, Owner will remove the following items:
    - a. Furniture.
    - b. Computers and office equipment.
    - c. Educational equipment, books, supplies, and tools.
    - d. Appliances.
- D. Hazardous Materials: Hazardous materials are present in buildings and structures to be demolished. An AHERA report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
  1. The school district will contract with a hazardous material abatement contractor to perform hazardous material remediation.
  2. In most cases the hazardous material will be removed by the hazardous material abatement contractor prior to start of work.
  3. The contractor is to coordinate their demolition work with the hazardous material abatement contractor to identify additional areas to be removed by the hazardous material abatement contractor.
  4. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. On-site storage or sale of removed items or materials is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
  1. Maintain fire-protection facilities in service during demolition operations.

#### 1.9 COORDINATION

- A. Arrange demolition schedule so as not to interfere with Owner's on-site operations.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.



2.2 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 31 20 00 "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- B. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

3.2 PREPARATION

- A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.
- B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
  - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
  - 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
  - 3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
- C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
  - 1. Strengthen or add new supports when required during progress of demolition.
- D. Salvaged Items: Comply with the following:
  - 1. Clean salvaged items of dirt and demolition debris.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to storage area designated by Owner.
  - 5. Protect items from damage during transport and storage.

3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

- B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
  - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
  - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
    - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 01 50 00 "Temporary Facilities and Controls."
  - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
  - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
  - 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
  - 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
  - 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
  - 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

### 3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
  - 2. Maintain fire watch during and for at least 4 hours after flame cutting operations.
  - 3. Maintain adequate ventilation when using cutting torches.
  - 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.
- C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

D. Explosives: Use of explosives is not permitted.

### 3.5 DEMOLITION BY MECHANICAL MEANS

A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

C. Removed and Recycled Items for the Benefit of the Owner:

1. Carefully remove items to get the best recycled value.
2. Pack or crate items after removal. Identify contents of containers.
3. Store items in a secure area until delivery to Waste Management Company for recycling.
4. Transport items to Waste Management Company.
5. Protect items from damage during transport and storage.
6. Contractor shall remit all funds received from Waste Management Company of items recycled for the benefit of the owner to the owner.

D. Salvage: Items to be removed and salvaged are indicated in Paragraph 3.10.

E. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including foundation walls and footings, completely.

F. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within 5 feet outside footprint indicated for new construction. Abandon utilities outside this area, unless otherwise indicated.

1. Fill abandoned utility structures with satisfactory soil materials according to backfill requirements in Section 31 20 00 "Earth Moving."
2. Piping: Disconnect piping at unions, flanges, valves, or fittings.
3. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

### 3.6 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Section 31 20 00 "Earth Moving."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill and/or recycling center.
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.9 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
  - 1. Clean roadways of debris caused by debris transport.

3.10 SALVAGED ITEMS RECYCLED FOR THE BENEFIT OF THE OWNER SCHEDULE

- A. Existing Items to Be Removed and Recycled for the Benefit of the Owner (unless otherwise noted on the drawings as salvage items or items to be reused in the project.)
  - 1. Chain-link and Wrought Iron Fencing.
  - 2. HVAC Equipment and Fans
  - 3. Electrical Switchgear
  - 4. Electrical Panel Boards
  - 5. Over Current Protection Devices
  - 6. Copper Wire/Conductors
  - 7. Rigid Metal and EMT Conduit
  - 8. Light Fixtures

**END OF SECTION 02 41 16**

**SECTION 03 30 00 - CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings.
  - 2. Concrete grade beams.
  - 3. Slabs-on-grade.
  - 4. Concrete over metal deck.
  - 5. Lean Mix Concrete
  - 6. Exposed concrete slabs-on-grade.
  - 7. Ground-mounted equipment and utility slabs-on-grade.
- B. Related Sections:
  - 1. Section 31 20 00 "Earth Moving" for free draining gravel course under slabs-on-grade.
  - 2. Section 32 13 13 "Concrete Paving" for concrete pavement and walks.

**1.3 DEFINITIONS**

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

**1.4 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, staining materials, and others as requested by the Architect.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Drawings that detail fabrication, bending, and placement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Include special reinforcement required and openings through concrete structures.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.
  - E. Samples: For vapor barrier, and Speed Dowel System.
  - F. Qualification Data: For Installer and Design Mixture Engineer (California Registered Civil or Structural Engineer).
  - G. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design tests as specified.
  - H. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by the Architect. Material certificates shall be signed by manufacturers and contractor, certifying that each material item complies with, or exceeds specified requirements:
- 1.5 QUALITY ASSURANCE
- A. Codes and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified.
    1. 2022 California Building Code – CCR Title 24, Part 2.
    2. ACI 301 "Specifications for Structural Concrete for Buildings." A registered civil engineer with experience in concrete mix design shall select the relative amounts of ingredients to be used as basic proportions of the concrete mixes proposed for use under CBC Section 1905A.2 and testing shall be performed in a laboratory acceptable to the enforcement agency.
    3. ACI 318 "Building Code Requirements for Reinforced Concrete."
    4. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
  - B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
  - C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."
  - D. Concrete Testing Service: The Owner shall employ a testing laboratory acceptable to the Architect and AHJ to perform material evaluation tests. Design of concrete mixes shall be by a registered civil engineer retained by the Contractor.
  - E. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at Owner's expense, including re-testing of rejected materials and installed work, shall be paid by Owner, but back-charged to the Contractor.
  - F. Testing shall be performed per Section 3.16 of these Specifications and CCR Title 24, Chapter 19A.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

**PART 2 - PRODUCTS**

**2.1 FORM-FACING MATERIALS**

- A. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
- B. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 1. Plywood, metal, or other approved panel materials.
  - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - a. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- C. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- D. Forms for Textured Finish (TX-Fn) Concrete: Form textured finished concrete surfaces with units of face design, size, arrangement and configuration as shown on drawings or as required to match Architect's concrete sample. Provide solid backing and form supports to ensure stability of textured form liners.
- E. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- F. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- G. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- H. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- I. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- J. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
  - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

**2.2 STEEL REINFORCEMENT**

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed, #4 and larger. For #3 use Grade 40.

- B. Weldable Steel Reinforcing Bars: ASTM A706, deformed.
- C. Low-Alloy-Steel Reinforcing Bars: ASTM A706, deformed.
- D. Plain-Steel Wire: ASTM A82, plain, cold-drawn, steel.

### 2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Slip Dowel System: Greenstreak two component Speed Dowel System to accept #4 x 12" to 24" long slip dowels (see drawings for size at specific details.) The Greenstreak Speed Dowel System is comprised of a reusable base and a plastic sleeve. Both pieces shall be manufactured from polypropylene plastic.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
  - 2. For slabs-on-grade, use supports with sand plates on horizontal runners where base material will not support chairs legs.

### 2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, Type II (low alkali) unless otherwise acceptable to Architect, gray
- B. Normal-Weight Aggregates: ASTM C33, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source. Other aggregates which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect and AHJ.
  - 1. Maximum Coarse-Aggregate Size: 1 1/2-inch nominal (U.O.N.).
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Concrete Sand: ASTM C33. Provide concrete sand from a single source.
- D. Water: ASTM C94 and potable.
- E. Calcium Chloride not permitted.
- F. Air-Entraining Admixture: ASTM C 260.
- G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride admixtures containing calcium chloride.



2.5 VAPOR BARRIER

- A. Sheet Vapor Barrier: ASTM E1745, Class A, except with maximum perm rating of 0.01 (grains/(ft<sup>2</sup> · hr · inHg) after mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Stego Industries, LLC; Stego Wrap Vapor Barrier (15 mil).
    - b. Architect and District approved equal.
- B. Vapor Barrier Accessories
  - 1. Seams:
    - a. Stego Industries, LLC; Stego Tape
  - 2. Sealing Penetrations of Vapor Barrier:
    - a. Stego Industries, LLC; Stego Mastic
    - b. Stego Industries, LLC; Stego Tape
  - 3. Perimeter/Edge Seal:
    - a. Stego Industries, LLC; Stego Crete Claw
  - 4. Penetration Prevention:
    - a. Stego Industries, LLC; Beast Foot
  - 5. Vapor Barrier-Safe Screed System:
    - a. Stego Industries, LLC; Beast Screed
- C. Free Draining Gravel Course: Specified in Section 31 20 00 "Earth Moving."

2.6 DECORATIVE GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

2.7 TEMPORARY FLOOR PROTECTION

- A. Temporary Floor Protection Membrane: Multi-ply, textured membrane laminated with a non-woven polypropylene geotextile, 18 mils thick. Equal to L.M. Scofield Company; Proguard Duracover.
- B. Heavy Duty Seaming Tape: Seaming Tape compatible with Floor Protection Membrane. Equal to L.M. Scofield Company; Proguard Duracover Seaming Tape.

2.8 LIQUID FLOOR TREATMENTS

- A. Liquid floor treatments shall comply with the testing and product 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."
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, non-dissipating.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C109.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.

2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C109.

## 2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, as specified in ACI 301 and Chapter 5 of ACI 318.
  1. Use a qualified independent testing agency, acceptable to Architect, for preparing and reporting proposed mixture designs based on laboratory trial mixtures. The testing shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.
  2. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.
- B. Adjustment to Concrete Mixes: Mix design adjustment may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and approved by Architect before using in work.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.

## 2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Reinforced Foundation Systems: Proportion normal-weight concrete mixture as follows:
  1. Minimum Compressive Strength: 3000 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.58.
  3. Slump Limit: Not more than 4".
  4. Air Content: Plus or minus 1.5 percent at point of delivery for 1.5-inch nominal maximum aggregate size.
- B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
  1. Minimum Compressive Strength: 3500 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.45.
  3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
  4. Slump Limit: Ramps and sloping surfaces - not more than 3". All other slabs - not less than 3" and not more than 5".
  5. Air Content: Plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
  6. Air Content: Do not allow air content of trowel-finished concrete floors to exceed 3 percent.
- C. Concrete Fill o/ Metal Deck: Proportion normal-weight concrete mixture as follows:
  1. Minimum Compressive Strength: 3500 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.52.
  3. Minimum Cementitious Materials Content: 520 lb/cu. yd.

4. Slump Limit: Ramps and sloping surfaces - not more than 3". All other slabs - not less than 3" and not more than 5".
5. Air Content: Plus or minus 1.5 percent at point of delivery for 3/8-inch nominal maximum aggregate size.
6. Air Content: Do not allow air content of trowel-finished concrete floors to exceed 3 percent.

D. Lean Mix (Sand Slurry): Proportion sand slurry concrete mixture as follows:

1. Minimum Compressive Strength: 50-125 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 2.03.
3. Minimum Cementitious Materials Content: 188 lb/cu. yd (2 sack)
4. Slump Limit: Not more than 9".
5. Air Content: Plus or minus 1.5 percent at point of delivery for Concrete Sand.

#### 2.14 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

#### 2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94, and furnish batch ticket information.
1. Delete references for allowing additional water to be added to batch for material with sufficient slump. Addition of water to the batch will not be permitted.
  2. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
  3. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

### PART 3 - EXECUTION

#### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch for smooth-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
  2. Do not use rust-stained steel form-facing material.

- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
  - 3. Install dovetail anchor slots in concrete structures as indicated.
- B. Place and secure edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
  - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place at least 14 days and until concrete has achieved its 28-day design compressive strength. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
  - 2. Form facing material may be removed 4 days after placement only if shores have been arranged to permit removal of forms without loosening or disturbing shores and supports.

- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces, except as acceptable to Architect.

### 3.4 SHORES AND RESHORES

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
  - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

### 3.5 VAPOR BARRIERS

- A. Sheet Vapor Barriers: Place, protect, and repair sheet vapor barrier according to ASTM E1643 and manufacturer's written instructions as submitted to and approved by Architect.
  - 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 placement whenever possible.
  - 2. Extend vapor barrier to the perimeter of the slab. At all points of termination (block-outs, interior grade beams, pad footings, perimeter edge, etc.), mechanically seal vapor barrier to the slab itself using Stego Crete Claw, per manufacturer's instructions.
  - 3. Lap joints 6 inches and seal with manufacturer's recommended tape.
  - 4. Apply seam tape/Crete Claw to clean and dry vapor barrier.
  - 5. Seal all penetrations (including pipes) per manufacturer's instructions.
  - 6. No penetration of the Vapor Barrier is allowed except for reinforcing steel and permanent utilities.
  - 7. For interior forming applications, avoid the use of non-permanent stakes, driven through the vapor barrier. Use blunt-end and/or threaded nail stakes (screed pad posts) and insert them into Beast Foot. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
  - 8. If non-permanent stakes must be driven through vapor barrier, repair as recommended by vapor barrier manufacturer.
  - 9. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
  - 10. For a vapor barrier-safe, fixed-elevation concrete screeding application, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.
  - 11. Repair damaged areas by cutting patches of Vapor Barrier, overlapping damaged area 6 inches and taping all four sides with tape.

### 3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
  - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

### 3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Locate and install construction joints, which are not shown on drawings, so strength and appearance of concrete are not impaired, as acceptable to Architect.
  - 1. Horizontal construction joints between successive concrete pours shall be properly cleaned by sandblasting 5 days (minimum) after initial concrete placement.
  - 2. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 3. Provide keyways at least 1 1/2" deep in construction joints in walls, slabs and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.
  - 4. Locate joints for slabs in the middle third of spans.
- C. Contraction Joints in Slabs-on-Grade: Contractor to provide jointing plan for approval by Architect. Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
  - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
  - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
  - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Slip Doweled Joints (Speed Dowel System): Install dowel bars and support assemblies at joints where indicated.
  - 1. Attach Speed Dowel System bases to the face of the concrete forms using a double headed nail or self-tapping screw.

2. Center of Speed Dowel System base shall be centered on form. Place edge forms plumb. Out of plumb forms will result in misaligned dowels.
3. Prior to pouring concrete, Speed Dowel System sleeve shall be slipped over Speed Dowel System base.
4. Pour concrete minimum of 18" from Speed Dowel System and work concrete around the Speed Dowel System. Concrete shall not be poured directly over the Speed Dowel System.
5. Concrete forms shall be removed with Speed Dowel System bases still attached. Speed Dowel System based may be reused.
6. Install slip dowels to the full depth of the embedded Speed Dowel System sleeve and proceed with next concrete pour. Greasing of dowels is not required as the embedded Speed Dowel System sleeve accommodates expansion and shrinkage movements that may occur. Bent or badly sheared slip dowels shall not be used. Saw cut dowels recommended.

### 3.8 CONCRETE PLACEMENT

- A. Preplacement Inspection, Notification: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Notify Architect, Structural Engineer, and AHJ by email and online 48 hours in advance of placement. Moisten wood forms immediately before placing concrete where form coatings are not used.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Maintain reinforcement in position on chairs during concrete placement.
  3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  4. Slope surfaces uniformly (2% maximum slope in all directions) to drains where required.
  5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.



1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas. Do not wet round concrete column forms.

### 3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish (RFm-Fn): As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish (SmFm-Fn): As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Grout-Cleaned Finish (GRTCI-Fn): Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.10 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
  - 1. Apply scratch finish to surfaces to receive concrete floor toppings.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
  - 1. Apply float finish to surfaces to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, and ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  - 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
    - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
  - 3. Interior exposed concrete floor slabs shall be slip resistant. Unless otherwise indicated, the static coefficient of friction (COF) shall not be less than 0.6 for level surfaces and 0.8 for ramps, per ASTM C1028-07 and Chapter 11B of CCR Title 24, Part 2, California Building Code as interpreted and enforced by the Division of the State Architect.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
  - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Non-Slip Broom Finish: Apply a non-slip broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
  - 1. Medium-Textured Broom Finish: Draw a stiff-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, medium-line texture.
    - a. Sidewalks and Ramps: Slopes less than 6%.
    - b. Stair Treads.
  - 2. Heavy-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
    - a. Ramps: Slopes of 6% or greater.

**3.11 MISCELLANEOUS CONCRETE ITEMS**

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

**3.12 CONCRETE PROTECTING AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following method:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - a. Removal: After curing period has elapsed and prior to installation of decorative floor treatments and resilient floor covering (rubber tile, sheet vinyl, and carpet), remove curing compound without damaging concrete surfaces by method recommended by decorative floor treatments and resilient floor covering manufacturers (these methods may be different).

### 3.13 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions as submitted to and accepted by Architect.
  1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  2. Do not apply to concrete that is less than 28 days' old.
  3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
  4. After final coat is applied and dried, remove surplus treatment by scrubbing and mopping with water.

### 3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions as submitted to and accepted by Architect.
  1. Defer joint filling until concrete has aged at least **one** month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes

- and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.
- 3.16 FIELD QUALITY CONTROL
- A. Testing and Inspecting: Owner will engage a qualified testing laboratory to perform field tests and prepare test reports.

- B. Waiver of Batch Plant Inspection: Batch plant inspection may be waived under the following condition:
1. The concrete plan complies fully with the requirements of ASTM C94, Sections 8 and 9, and has a current certificate from the National Ready Mixed Concrete Association or another agency. The certification shall indicate that the plant has automatic batching and recording capabilities.
  2. When batch plant inspection is waived the following requirements shall apply:
    - a. An approved inspector of the testing laboratory shall check the first batching at the start of work and furnish mix proportions to the licensed weighmaster.
    - b. The licensed weighmaster shall positively identify materials as to quantity and certify each load by a ticket.
    - c. The ticket shall be transmitted to the project superintendent by a truck driver with load identified thereon. The superintendent will not accept the load without a load ticket identifying the mix. The superintendent will keep a daily record of placements, identifying each truck, its load and time of receipt, and approximate location of deposit in the structure.
    - d. At the end of the project, the weighmaster shall furnish an affidavit to Contractor on form SSS 411-8 certifying that all concrete furnished conforms in every particular to the particular to the proportions established by mix designs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to CBC Section 1705.3 and ASTM C172 shall be performed according to the following requirements:
1. Testing Frequency: Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C231, pressure method, for normal-weight concrete; **one** test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  6. Compression Test Specimens: ASTM C31.
    - a. Cast and laboratory cure one set of three standard cylinder specimens for each composite sample, unless otherwise directed.
  7. Compressive-Strength Tests: ASTM C39; test one of the three laboratory-cured specimens at 7 days and one of the three specimens at 28 days.

8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, concrete batch plant, and Contractor on same day that tests are made. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Additional Tests: The testing service shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. If the strength acceptance criteria are not met, the concrete will be deemed defective and shall be placed or adequately strengthened in a manner outlined by the Architect or Structural Engineer.

**3.17 PROTECTION**

- A. The General Contractor is responsible for using TEMPORARY FLOOR PROTECTION throughout the project to safeguard the surface quality of concrete slabs before and after application of decorative finishes or installation of other materials.
- B. All concrete floors that will not be covered by other materials shall be protected throughout the project. The concrete slab shall be treated as a finished floor at all times during construction.
- C. TEMPORARY FLOOR PROTECTION shall be installed per manufacturer's published installation procedures. Overlapped seams shall be taped with Heavy Duty Seaming Tape
- D. Do not apply the Heavy-Duty Seaming Tape to bare or finished floors or wall surfaces at any time. The tape will permanently damage the surface.

**3.18 MAINTENANCE**

- A. Maintain exposed concrete floors by sweeping. Clean spills when they occur and rinse dirt off with water. Wet-clean heavily soiled areas by mopping or by scrubbing with a rotary floor machine equipped with a scrubbing brush and a suitable, high quality commercial detergent.

**END OF SECTION 03 30 00**

**SECTION 03 52 16 - LIGHTWEIGHT INSULATING CONCRETE SYSTEM (LWIC)**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place cellular lightweight insulating concrete.
- B. Related Sections:
  - 1. Section 07 55 00 "Modified Kee Membrane Roofing" for installation of roofing membrane over LWIC.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include mixing and application instructions for each type of lightweight insulating concrete.
- B. Shop Drawings: Include plans, sections, and details showing roof slopes, lightweight insulating concrete thicknesses, embedded insulation board, roof penetrations, roof perimeter terminations and curbs, and roof drains.
- C. Design Mixtures: For each lightweight insulating concrete mix.
- D. Qualification Data: For qualified Installer and testing agency.
- E. Product Certificates: For the following, from manufacturer:
  - 1. Cementitious materials.
  - 2. Foaming agents.
  - 3. Molded-polystyrene insulation board.
- F. Material Test Reports: For lightweight aggregates, from a qualified testing agency, indicating compliance with requirements.
- G. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An Installer who employs and retains, throughout the project, supervisors who are trained and approved by the manufacturer.
  - 1. A firm that has been evaluated by UL and found to comply with requirements of the National Roof Deck Contractors Association Lightweight Insulating Concrete Roof Deck Contractors (LWIC) Accreditation Program.
- B. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.



- C. FM Approvals Listing: Provide lightweight insulating concrete evaluated by FM Approvals as part of a roof assembly and listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable.
- D. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original undamaged packages or acceptable bulk containers.
- B. Store packaged materials to protect them from elements or physical damage.
- C. Do not use cement that shows indications of moisture damage, caking, or other deterioration.

#### 1.6 PROJECT CONDITIONS

- A. Do not place lightweight insulating concrete unless ambient temperature is at least 40 deg F and rising.
  - 1. When air temperature has fallen or is expected to fall below 40 deg F, heat water to a maximum 120 deg F before mixing so lightweight insulating concrete, at point of placement, reaches a temperature of 50 deg F minimum and 80 deg F maximum.
- B. Do not place lightweight insulating concrete during rain or snow or on surfaces covered with standing water, snow, or ice.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Cementitious Material: Portland cement, ASTM C 150, Type I.
- B. Foaming Agent: ASTM C 869.
- C. Water: Clean, potable.
- D. Molded-Polystyrene Insulation Board: ASTM C 578, Type I, 0.90-lb/cu. ft. minimum density.
  - 1. Provide units with manufacturer's standard keying slots of approximately 3 percent of board's gross surface area.

#### 2.2 DESIGN MIXTURES

- A. Prepare design mixtures for each type and strength of lightweight insulating concrete by laboratory trial batch method or by field-test data method. For trial batch method, use a qualified independent testing agency for preparing and reporting proposed mixture designs.
  - 1. Limit use of fly ash to not exceed 25 percent of portland cement by weight.
- B. Limit water-soluble chloride ions to the maximum percentage by weight of cement or cementitious material permitted by ACI 301.

#### 2.3 CELLULAR LIGHTWEIGHT INSULATING CONCRETE

- A. Produce cellular lightweight insulating concrete with the following minimum physical properties using cementitious materials, air-producing liquid-foaming agents, and the minimum amount of water necessary to produce a workable mix.

1. Basis of Design Product: Subject to compliance with requirements, provide **Elastizell Corporation of America; Composite Insulating Roof Deck System** or comparable product by one of the following:
  - a. Aerix Industries, Mearlcrete Division.
  - b. Celcore Incorporated.
  - c. Architect and District approved equal.
2. As-Cast Unit Weight: 34 to 42 lb/cu. ft. at point of placement, when tested according to ASTM C 138.
3. Air-Dry Unit Weight: 26 to 34 lb/cu. ft. when tested according to ASTM C 796.
4. Compressive Strength: Minimum 160 psi, when tested according to ASTM C 796.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Prior to starting work, any unsatisfactory conditions of related trades shall be corrected before start of LWIC installation.
- B. General Contractor shall clear the deck of all standing water, dirt, and debris.
- C. Seal seams, joints, and gaps to prevent bleed water and LWIC from penetrating the space below the deck.
- D. Provide stainless steel fasteners for mounting below deck conduits, pipes, hangers, etc.**

#### 3.2 MIXING AND PLACING

- A. Mix and place lightweight insulating concrete according to manufacturer's written instructions, using equipment and procedures to avoid segregation of mixture and loss of air content.
- B. Install insulation board according to lightweight insulating concrete manufacturer's written instructions. Place insulation board in wet, lightweight insulating concrete slurry poured a minimum of 1/8 inch over the structural substrate. Ensure full contact of insulation board with slurry. Stagger joints and tightly butt insulation boards.
  1. Install insulation board in a stair-step configuration with a maximum step-down of 1 inch.
- C. Deposit and screed lightweight insulating concrete in a continuous operation until an entire panel or section of roof area is completed. Plan work to minimize cold joints. Scarify cold joint to provide a mechanical key. Do not vibrate or work mix except for screeding or floating. Place to 2 inches minimum thickness, sloped to drains at ¼ inch per running foot minimum.
- D. Finish top surface smooth, free of ridges and depressions, and maintain surface in condition to receive subsequent roofing system.
- E. Begin curing operations immediately after placement and air cure for not less than three days, according to manufacturer's written instructions to achieve sufficient surface hardness to adequately withstand foot traffic and other light roofing operations without damage.
- F. If ambient temperature falls below 32 deg F, protect lightweight insulating concrete from freezing and maintain temperature recommended by manufacturer for 72 hours after placement.

- G. The roof deck shall not be left exposed for longer than 5 to 7 days.
- H. Protect the insulating concrete roof deck from construction traffic.
- I. Upon completion of the LWIC system, the roofing contractor is responsible for minimizing water entry into the LWIC system and for removing excess water (from rain) from the LWIC system. Follow recommendations for the removal of excess rain water from the system if rain infiltration occurs.
- J. The exposed surface and entire LWIC system shall be dry prior to installation of the roof membrane system.
- K. Roof membrane shall be installed per Project Manual Section 07 55 00 – Modified Kee Membrane Roofing.
- L. Clean and remove any LWIC material that penetrates to underside of metal deck within 5 to 7 days of placement.

### 3.3 FIELD QUALITY CONTROL

- A. Testing: Manufacturer shall sample materials, perform field tests and inspections, and prepare test reports.
- B. Testing of samples of lightweight insulating concrete obtained according to ASTM C 796, shall be performed according to the following requirements:
  - 1. Determine air-dry unit weight and compressive strength according to ASTM C 796. Make a set of at least four molds sampled at point of placement daily, but not less than one set of molds for each 100 cubic yards of material placed.
  - 2. Perform additional tests when test results indicate that as-cast unit weight, air-dry unit weight, compressive strength, or other requirements have not been met.
    - a. Retest cast-in-place lightweight insulating concrete for air-dry unit weight and compressive strength.

### 3.4 DEFECTIVE WORK

- A. Refinish, or remove and replace, lightweight insulating concrete if surfaces are excessively scaled or too rough to receive roofing according to roofing membrane manufacturer's written instructions.
- B. Remove and replace lightweight insulating concrete that fails to comply with requirements.

### 3.5 INSULATION VALUE

- A. R-value required, as determined by the Title 24 Report for this project, is R=19.6. The design R-value of this product is determined by the average thickness, 5.5 inches, at R=4.5 per inch of roof. Design R=24.8.

**END OF SECTION 03 52 16**

**SECTION 04 22 00 - CONCRETE UNIT MASONRY**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Concrete masonry units.
  - 2. Mortar and grout.
  - 3. Steel reinforcing bars.
  - 4. Miscellaneous masonry accessories.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
  - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
- C. Material Certificates: For each type and size of the following:
  - 1. Masonry units.
    - a. Include data on material properties.
  - 2. Cementitious materials. Include brand, type, and name of manufacturer.
  - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  - 4. Grout mixes. Include description of type and proportions of ingredients.
  - 5. Reinforcing bars.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

## PART 2 - PRODUCTS

### 2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

### 2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  2. Provide square-edged units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
  1. Density Classification: Lightweight.
  2. Size (nominal): 8 inches wide x 8 inches high x 16 inches long. Manufactured to dimensions 3/8 inch less than nominal dimensions.

### 2.3 MASONRY LINTELS

- A. General: Provide one of the following:
- B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

### 2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

E. Aggregate for Grout: ASTM C 404.

F. Cold-Weather Admixture: Non-chloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Euclid Chemical Company (The); Accelguard 80.
  - b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
  - c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

G. Water: Potable.

## 2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60.

## 2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
  - b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
  - c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
  - d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

## 2.7 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
  - 1. For reinforced masonry, use Type S.
  - 2. Mortar Strength: 1800 psi.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
  - 2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 1900 psi.
  - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION, GENERAL**

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

#### **3.3 TOLERANCES**

- A. Dimensions and Locations of Elements:
  - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.



2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

**B. Lines and Levels:**

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

**C. Joints:**

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

**3.4 LAYING MASONRY WALLS**

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

- G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
  - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
  - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

### 3.6 LINTELS

- A. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

### 3.7 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
  - 1. All cells shall be filled solidly with grout.
  - 2. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 and CBC section 2104A.5.1.2 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
  - 3. Limit height of vertical grout pours to not more than 48 inches. Comply with requirements of CBC section 2104A.5.1.2.2 low-lift grouted construction.
  - 4. All grouting shall be done under the continuous observation of the owner's testing laboratory.
  - 5. If grout lifts exceed 4'-0", they shall be approved by DSA prior to construction and clean out openings shall be provided in every cell at the bottom of each pour. The cleanouts shall be sealed after inspection and before grouting.

**3.8 FIELD QUALITY CONTROL**

- A. Testing and Inspecting: Owner will engage an independent testing lab, approved by the Architect and DSA, to perform tests and inspections and prepare reports. Allow inspectors access work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 2 special inspections according to CBC Section 1704A.5, CBC Table 1705A.5.3 and CBC Section 2105A.
  - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
  - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
  - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- F. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- G. Prism Test: For each type of construction provided, according to ASTM C 1314 at 28 days.

**3.9 REPAIRING, POINTING, AND CLEANING**

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  - 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.10 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

**END OF SECTION 04 22 00**

**SECTION 05 12 00 - STRUCTURAL STEEL FRAMING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Sections:

1. Section 05 12 13 "Architecturally Exposed Structural Steel" (AESS) for finish quality.
2. Section 05 31 00 "Steel Decking" for field installation of shear connectors through deck.
3. Section 05 50 00 "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

B. California Green Building Standards Code Submittals:

1. Laboratory Test Reports: For primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.

- D. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
    - 1. Power source (constant current or constant voltage).
    - 2. Electrode manufacturer and trade name.
  - E. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welding connections. Include data on types of tests conducted and test results.
  - F. Qualification Data: For qualified Installer and fabricator.
  - G. Welding certificates indicating that welders employed in the work have satisfactorily passed AWS Qualification tests. If recertification of welders is required, retesting will be Contractor's responsibility.
  - H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
  - I. Mill test reports for structural steel, including chemical and physical properties.
  - J. Product Test Reports: For the following:
    - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
    - 2. Direct-tension indicators.
    - 3. Tension-control, high-strength bolt-nut-washer assemblies.
    - 4. Shear stud connectors.
    - 5. Shop primers.
    - 6. Non-shrink grout.
  - K. Source quality-control reports.
- 1.5 QUALITY ASSURANCE
- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
  - B. Comply with applicable provisions of the following specifications and documents, except as otherwise indicated:
    - 1. AISC 303 "Code of Standard Practice for Steel Buildings and Bridges."
    - 2. AISC 360 "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings," 2022, including "Commentary" and Supplements thereto as issued.
    - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
    - 4. AWS D1.1 "Structural Welding Code."
    - 5. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
  - C. Preinstallation Conference: Conduct conference at Project site.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- D. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  - 2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
  - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F1852 fasteners and for retesting fasteners after lubrication.

#### 1.7 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

### PART 2 - PRODUCTS

#### 2.1 STRUCTURAL-STEEL MATERIALS

- A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.
- B. W-Shapes: ASTM A992.
- C. Channels, Angles: ASTM A36.
- D. Plate and Bar: ASTM A36.
- E. Cold-Formed Hollow Structural Sections: ASTM A500, Grade C, 50 ksi, structural tubing.
- F. Steel Pipe: ASTM A53, Type E or S, Grade B.
  - 1. Finish: Black.
- G. Steel Castings: ASTM A216, Grade WCB with supplementary requirement S11.
- H. Steel Forgings: ASTM A668.
- I. Welding Electrodes: Comply with AWS requirements and the following:

1. All welding to be done using E70xx electrodes.
2. For welding ASTM A572 grade 50 and ASTM A992 steel, maximum diffusible hydrogen content: 16ml/100g (H16).
3. Charpy V-Notch Toughness: 20 ft-lbs at 0°F (minimum.)

## 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Machine Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade C, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
  1. Direct-Tension Indicators: ASTM F959, Type 325, compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
  1. Finish: Hot-dip or mechanically deposited zinc coating.
  2. Direct-Tension Indicators: ASTM F959, Type 325, compressible-washer type with mechanically deposited zinc coating.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
  1. Finish: Plain.
- E. Shear Connectors: ASTM A108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- F. Unheaded Anchor Rods: ASTM F1554, Grade 36.
  1. Configuration: Straight.
  2. Nuts: ASTM A563 heavy-hex carbon steel.
  3. Plate Washers: ASTM A36 carbon steel.
  4. Washers: ASTM F436, Type 1, hardened carbon steel.
  5. Finish: Plain.
- G. Headed Anchor Rods: ASTM F1554, Grade 36, straight.
  1. Nuts: ASTM A563 heavy-hex carbon steel.
  2. Plate Washers: ASTM A36 carbon steel.
  3. Washers: ASTM F436, Type 1, hardened carbon steel.
  4. Finish: Plain.
- H. Threaded Rods: ASTM A 36.
  1. Nuts: ASTM A563 heavy-hex carbon steel.
  2. Washers: ASTM A36 carbon steel.
  3. Finish: Plain.



- I. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A108, Grade 1035.
- J. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1030.
- K. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1018.

### 2.3 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

### 2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
  - 1. Minimum Compressive Strength: 7500 psi at 28 days.

### 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
  - 1. Camber structural-steel members where indicated.
  - 2. Fabricate beams with rolling camber up.
  - 3. Identify high-strength structural steel according to ASTM A6 and maintain markings until structural steel has been erected.
  - 4. Mark and match-mark materials for field assembly.
  - 5. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
  - 6. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, **or** punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/ and manufacturer's written instructions.
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
  - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened and Slip critical. Refer to structural drawings.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  - 2. Surfaces to be field welded.
  - 3. Surfaces to be high-strength bolted with slip-critical connections.
  - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Painting: Prepare steel and apply a one-coat, non-asphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 2.0 mils.

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
- D. Welded Connections: If required, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
  - 1. Liquid Penetrant Inspection: ASTM E165.
  - 2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3. Ultrasonic Inspection: ASTM E164.
  - 4. Radiographic Inspection: ASTM E94.
- E. If required, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Surveys: Employ a registered professional engineer or land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect.
- B. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.

#### **3.2 PREPARATION**

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
  1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

#### **3.3 ERECTION**

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Anchor Bolts: Furnish Anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
  1. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.
  2. Refer to Division 3 of these specifications for anchor bolt installation requirements in concrete.
- C. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  1. Set plates for structural members on setting (leveling) nuts as required.
  2. Weld plate washers to top of baseplate.
  3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- E. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be

in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

F. Splice members only where indicated.

G. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.

H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

### 3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened and Slip critical.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.
4. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

### 3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. If required, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
  - a. Liquid Penetrant Inspection: ASTM E165.
  - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - c. Ultrasonic Inspection: ASTM E164.

d. Radiographic Inspection: ASTM E94.

- D. If required, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

### 3.6 REPAIRS AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

**END OF SECTION 05 12 00**

**SECTION 05 12 13 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes architecturally exposed structural-steel (AESS).
  - 1. Requirements in Section 05 12 00 "Structural Steel Framing" also apply to AESS.
  - 2. Requirements in Section 09 91 00 "Painting and Finishing".

**1.3 DEFINITIONS**

- A. AESS: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.
- B. Category 1 AESS: AESS that is within 96 inches vertically and 36 inches horizontally of a walking surface and that is visible to a person standing on that walking surface or is designated as "Category 1 architecturally exposed structural steel" or "AESS-1" in the Contract Documents.
- C. Category 2 AESS: AESS that is within 20 feet vertically and horizontally of a walking surface and that is visible to a person standing on that walking surface or is designated as "Category 2 architecturally exposed structural steel" or "AESS-2" in the Contract Documents.
- D. Category 3 AESS: AESS that is not defined as Category 1 or Category 2 or that is designated as "Category 3 architecturally exposed structural steel" or "AESS-3" in the Contract Documents.

**1.4 COORDINATION**

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

**1.5 SUBMITTALS**

- A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment Drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation of bolt heads.

5. Indicate exposed surfaces and edges and surface preparation being used.
6. Indicate special tolerances and erection requirements.

B. Samples: Submit Samples of AESS to set quality standards for exposed welds .

1. Two steel plates, 3/8 by 8 by 4 inches, with long edges joined by a groove weld and with weld ground smooth.
2. Steel plate, 3/8 by 8 by 8 inches, with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches, welded to plate with a continuous fillet weld and with weld ground smooth and blended.

C. Qualification Data: For Installer and fabricator.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

#### 1.7 FIELD CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

### PART 2 - PRODUCTS

#### 2.1 FILLER

A. Filler: Polyester filler intended for use in repairing dents in automobile bodies.

#### 2.2 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

B. In addition to special care used to handle and fabricate AESS, comply with the following:

1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
2. Grind sheared, punched, and flame-cut edges of Category 1 AESS to remove burrs and provide smooth surfaces and edges.
3. Fabricate Category 1 AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
4. Fabricate Category 1 and Category 2 AESS with exposed surfaces free of seams to maximum extent possible.
5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.

6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
  7. Fabricate Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
  8. Fabricate Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
  9. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates for Category 1 AESS.
- C. Curved Members: Fabricate indicated members to curved shape by rolling to final shape in fabrication shop.
1. Distortion of webs, stems, outstanding flanges, and legs of angles shall not be visible from a distance of 20 feet under any lighting conditions.
  2. Tolerances for walls of hollow steel sections after rolling shall be approximately 1/2 inch.
- D. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for Category 1 AESS.
- E. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
1. Cut, drill, or punch holes perpendicular to steel surfaces.
  2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

### 2.3 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened and Slip critical. Refer to structural drawings.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
  2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
  3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where Category 1 AESS is exposed to weather.
  4. Provide continuous welds of uniform size and profile where Category 1 AESS is welded.
  5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch for Category 1 and Category 2 AESS.
  6. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch for Category 1 and Category 2 AESS. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
  7. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.



8. At locations where welding on the far side of an exposed connection of Category 1 and Category 2 AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
9. Make fillet welds for Category 1 and Category 2 AESS oversize and grind to uniform profile with smooth face and transition.
10. Make fillet welds for Category 1 and Category 2 AESS of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

## 2.4 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
  2. Surfaces to be field welded.
  3. Surfaces to be high-strength bolted with slip-critical connections.
  4. Surfaces to receive sprayed fire-resistive materials.
  5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  1. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Surveys: Employ a registered professional engineer or land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect.
- B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.
2. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

### 3.3 ERECTION

- A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
  1. Erect Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
  2. Erect Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
- B. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  1. Joint Type: Snug tightened and Slip critical.
  2. Orient bolt heads in same direction for each connection and to maximum extent possible in same direction for similar connections.
- B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.
  1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
  2. Remove erection bolts in AESS, fill holes, and grind smooth.
  3. Fill weld access holes in AESS and grind smooth.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect AESS as specified in Section 05 12 00 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
- B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

### 3.6 REPAIRS AND PROTECTION

- A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.

**END OF SECTION 05 12 13**

**SECTION 05 31 00 - STEEL DECKING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Roof deck.
- 2. Composite floor deck.

B. Related Requirements:

- 1. Section 03 30 00 "Cast-in-Place Concrete" for normal-weight structural concrete fill over steel deck.
- 2. Section 03 52 16 "Lightweight Insulating Concrete System" for lightweight insulating concrete over metal deck at the roof.
- 3. Section 05 12 00 "Structural Steel Framing" for shop- and field-welded shear connectors.
- 4. Section 05 50 00 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.3 SUBMITTALS

- A. Product Data and Manufacturer's Specifications: For each type of deck, accessory, and product indicated.
- B. Manufacturer's recommended installation procedures which when approved by Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.
- C. Shop Drawings:
  - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- D. Welding certificates.
- E. Product Certificates: For each type of steel deck.
- F. Evaluation Reports: For steel deck and power-actuated mechanical fasteners.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- B. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

- C. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
  - 2. Steel deck manufacturer shall supply deck free of lubricants or oils which would impair the adhesion of spray applied fireproofing.
  - 3. The deck manufacturer shall certify that the steel deck has been fire tested with the appropriate fireproofing material.

#### 2.2 ROOF DECK

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Verco Manufacturing Co.; 3.5D (IAPMO UES ER-2018) or equal.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
  - 1. Galvanized-Steel Sheet: ASTM A 653 (Fy= 40 ksi), Structural Steel (SS), Grade 40 (minimum), G90 zinc coating.
  - 2. Deck Profile: Dovetail.
  - 3. Profile Depth: 3-1/2 inches.
  - 4. Design Uncoated-Steel Thickness: As indicated on approved drawings.
  - 5. Span Condition: As indicated on approved drawings.
  - 6. Side Laps: Nested Side-Lap.

#### 2.3 COMPOSITE FLOOR DECK

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Verco Manufacturing Co.; 3.5D (IAPMO UES ER-2018) or equal.
- B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A653 (Fy= 40 ksi), Structural Steel (SS), Grade 40, G60 zinc coating.
2. Deck Profile: Dovetail.
3. Profile Depth: 3 1/2 inches.
4. Design Uncoated-Steel Thickness: As Indicated on approved drawings.
5. Span Condition: As indicated on approved drawings.

## 2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated as submitted to and approved by Architect.
- B. Powder Actuated Fasteners (Shot Pins): Hilti, Inc., Powder Actuated Fasteners per ICC ESR-2197 or an approved equal with current ICC ES Report tested per ICC ES AC 43 as shown and called for on the approved drawings.
- C. Side-Lap Fasteners: Verco Punchlok or ASC DeltaGrip as shown and called for on the approved drawings.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber (neoprene).
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- G. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- H. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section as submitted to and approved by Architect.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.

- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

### 3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members with mechanical fasteners as shown on the approved drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as shown on the approved drawings with the steel deck manufacturer's required tool.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  - 1. End Joints: Butted.
- D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions as submitted to and approved by Architect and as detailed on the drawings. Weld or mechanically fasten to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- E. **Flexible Closure Strips:** Install flexible closure strips over **partitions, walls, and where indicated on drawings**. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

### 3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
  - 1. Weld Diameter: 1 inch, nominal.
  - 2. Weld Spacing: Space and locate welds as indicated on the approved drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as shown on the approved drawings with the steel deck manufacturer's required tool.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Butted.

- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. **Flexible Closure Strips:** Install flexible closure strips over **partitions, walls, and where indicated on drawings.** Install with adhesive according to manufacturer's written instructions to ensure complete closure.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Architect, Owner, and Contractor.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

### 3.6 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780 and manufacturer's written instructions as submitted to and approved by Architect.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

**END OF SECTION 05 31 00**

**SECTION 05 40 00 - COLD-FORMED METAL FRAMING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Load-bearing wall framing.
  - 2. Non-load-bearing wall framing.
  - 3. Ceiling joist framing.
  - 4. Soffit framing.

- B. Related Requirements:

**1.3 SUBMITTALS**

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Welding certificates.
- C. Research Reports: For cold-formed steel framing, from ICC-ES.

**1.4 QUALITY ASSURANCE**

- A. Welding Qualifications: 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."

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

**PART 2 - PRODUCTS**

**2.1 COLD-FORMED STEEL FRAMING, GENERAL**

- A. Steel Sheet: ASTM A1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: ST33H and ST50H as called for on drawings.
  - 2. Coating: G60.



2.2 WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Base-Metal Thickness: 0.0428 inch (18 gauge) to 0.0966 inch (12 gauge) as shown on approved drawings.
  - 2. Flange Width: 1-3/8 inches, minimum as shown on approved drawings.
  
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated on approved drawings, unpunched, with straight flanges, and as follows:
  - 1. Base-Metal Thickness: Matching steel studs, minimum.
  - 2. Flange Width: 1-1/4 inches, minimum.
  
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
  - 1. Base-Metal Thickness: 0.0428 inch (18 gauge) to 0.0966 inch (12 gauge) as shown on approved drawings.
  - 2. Flange Width: 1-3/8 inches, minimum as shown on approved drawings.
  
- D. Slip Deflection Track (where shown on approved drawings): Manufacturer's single, deep-leg, U-shaped steel track; with horizontal slotted web and vertical slotted flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to be fastened to the studs, support horizontal loads, and transfer them to the primary structure, and as follows:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Brady Construction Innovations Inc.; SLP-TRK (ICC ESR-1042) or an approved equal with current ICC-ES evaluation report or other acceptable evaluation reports or testing.
    - a. Minimum Base-Metal Thickness: Matching steel studs as shown on approved drawings. (16 gauge minimum at exterior walls)
    - b. Flange Width: 2-1/2 inches
    - c. Flange Slots: 1/4 inch wide by 1 1/2 inches long spaced every 1 inch along length of track.
    - d. Web Slots: Two 3/16 inch wide by 2 1/4 inches long spaced 8 inches o.c., staggered.
  
- E. Double Deflection Tracks (where shown on approved drawings): Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
  - 1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
    - a. Minimum Base-Metal Thickness: Matching steel studs as shown on approved drawings, minimum. (16 gauge minimum at exterior walls).
    - b. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications. Refer to approved drawings for design gap.
  
  - 2. Inner Track: Of web depth indicated, and as follows:

- a. Minimum Base-Metal Thickness: Matching steel studs as shown on approved drawings, minimum. (16 gauge minimum at exterior walls).
- b. Flange Width: Equal to sum of outer deflection track flange width plus 1 inch.

### 2.3 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated on approved drawings, punched with standard holes, with stiffened flanges, and as follows:
  1. Base-Metal Thickness: 0.0428 inch (18 gauge) to 0.0966 inch (12 gauge) as shown on approved drawings.
  2. Flange Width: 1-5/8 inches, minimum as shown on approved drawings.

### 2.4 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
  1. Base-Metal Thickness: 0.0428 inch (18 gauge) to 0.0966 inch (12 gauge) as shown on drawings.
  2. Flange Width: 1-3/8 inches, minimum as shown on approved drawings.
  3. Section Properties: Refer to drawings.

### 2.5 SUSPENDED GYPSUM BOARD CEILING

- A. Cross Furring Hat Channel: 7/8" galvanized hat channel.
  1. Base-Metal Thickness: 0.0188 inch (25 gauge) as shown on drawings.
  2. Width: 1-1/4 inches, minimum as shown on approved drawings.
  3. Flange Width: 1/2" , minimum as shown on approved drawings.
  4. Section Properties: Refer to drawings.

### 2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  1. Supplementary framing.
  2. Bracing, bridging, and solid blocking (unpunched).
  3. Web stiffeners.
  4. Anchor clips.
  5. End clips.
  6. Foundation clips.
  7. Gusset plates.
  8. Stud kickers and knee braces.
  9. Joist hangers and end closures.
  10. Hole reinforcing plates.
  11. Backer plates.
  12. Hanger Wires

**2.7 ANCHORS, CLIPS, AND FASTENERS**

- A. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dip process according to ASTM A123.
- B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts, headless, hooked bolts or headless bolts, with encased end threaded, and carbon-steel nuts; and flat, hardened-steel washers. The anchor bolt assembly shall be zinc coated by hot-dip process according to ASTM A 153, Class C or mechanically deposition according to ASTM B 695, Class 50.
- C. Expansion Anchors: Current ICC-ES evaluation report or other acceptable evaluation report meeting the requirements. Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to 2022 CBC, section 1905A; ICC-ES AC193 and ACI 318-14 greater than or equal to the design load, as determined by testing per ASTM E488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Current ICC-ES evaluation report or other acceptable evaluation report meeting the requirements. Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
  - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

**2.8 MISCELLANEOUS MATERIALS**

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.
- B. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C1107, with fluid consistency and 30-minute working time.
- C. Shims: Load bearing, high-density multimonomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

**3.3 INSTALLATION, GENERAL**

- A. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions as submitted to and approved by Architect unless more stringent requirements are indicated on drawings.
- B. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.
  - 2. Fasten cold-formed steel framing members by welding or screw fastening. Wire tying of framing members is not permitted except where specifically detailed on drawings.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- C. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- E. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- F. Install insulation, specified in Section 07 21 00 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- H. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### 3.4 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
  - 1. Anchor Spacing: As shown on approved drawings.
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
  - 1. Stud Spacing: 16 inches maximum unless otherwise indicated on approved drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads as detailed on drawings.
- E. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- F. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates as detailed on approved drawings.
  - 1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on drawings. Fasten jamb members together to uniformly distribute loads.
  - 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- G. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
  - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- H. Install horizontal bridging in stud system, spaced vertically as indicated on approved drawings. Fasten at each stud intersection.
  - 1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
  - 2. Bridging (**Plumbing Walls and walls greater than 8" deep**): Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  - 3. Bridging (**Solid Blocking**): Where shown on the drawings install stud or stud track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

- I. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.5 NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
  1. Stud Spacing: 16 inches maximum unless otherwise indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  1. Install single deep-leg deflection tracks and anchor to building structure.
  2. Install double deep-leg deflection tracks and anchor outer track to building structure.
  3. Connect vertical deflection clips to bypassing studs and anchor to building structure as detailed on the approved drawings.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on approved drawings but not more than 48 inches apart. Fasten at each stud intersection. **For non-load bearing walls, bridging is not required when sheathing is installed on both sides of the wall.**
  1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
  2. Bridging (**Plumbing walls**): Combination of flat, taut, steel sheet straps of width and thickness indicated on drawings and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  3. Bridging (**Solid Blocking**): Where shown on the drawings install stud or stud track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.6 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
  1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
  2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on drawings.
- C. Space joists not more than 2 inches from abutting walls, and as follows:

1. Joist Spacing: As indicated on the drawings.
  - D. Frame openings with built-up joist headers consisting of joist and joist track as detailed on drawings.
  - E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on drawings.
    1. Install web stiffeners to transfer axial loads of walls above.
  - F. Install bridging at intervals indicated on approved drawings. Fasten bridging at each joist intersection as follows:
    1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
  - G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
  - H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.
- 3.7 FIELD QUALITY CONTROL
- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
  - B. Field and shop welds will be subject to testing and inspecting.
  - C. Testing agency will report test results promptly and in writing to Contractor, Owner, Structural Engineer, and Architect.
  - D. Remove and replace work where test results indicate that it does not comply with specified requirements.
  - E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 3.8 REPAIRS AND PROTECTION
- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
  - B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

**END OF SECTION 05 40 00**

**SECTION 05 50 00 - METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

A. Section Includes:

- 1. Steel framing and supports for countertops.
- 2. Steel framing and supports for mechanical and electrical equipment.
- 3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- 4. Metal ladders.
- 5. Metal floor plate.
- 6. Miscellaneous steel trim.
- 7. Metal bollards.
- 8. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section:

- 1. Loose steel lintels.
- 2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Sections:

- 1. Section 03 30 00 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
- 2. Section 05 12 00 "Structural Steel Framing."

**1.3 PERFORMANCE REQUIREMENTS**

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

**1.4 SUBMITTALS**

A. Product Data: For the following:

- 1. Paint products.
- 2. Grout.

B. 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.



- C. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.
- D. Welding certificates.
- E. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

#### 1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code - Steel."
  - 2. AWS D1.2, "Structural Welding Code - Aluminum."
  - 3. AWS D1.6, "Structural Welding Code - Stainless Steel."

#### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

#### 1.7 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. 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.

### PART 2 - PRODUCTS

#### 2.1 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.

#### 2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A36.
- B. Rolled-Steel Floor Plate: ASTM A786, rolled from plate complying with ASTM A36 or ASTM A283, Grade C or D.
- C. Steel Tubing: ASTM A500, cold-formed steel tubing.
- D. Steel Pipe: ASTM A53, standard weight (Schedule 40) unless otherwise indicated.

- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  - 1. Size of Channels: As indicated.
  - 2. Material: Cold-rolled steel, ASTM A1008/, structural steel, Grade 33; 0.0966-inch (12 gauge) minimum thickness; unfinished.
- F. Cast Iron: Either gray iron, ASTM A48, or malleable iron, ASTM A47, unless otherwise indicated.

### 2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B632, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B26, Alloy 443.0-F.

### 2.4 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 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - 1. Provide stainless-steel fasteners for fastening aluminum.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.
- E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
  - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Eyebolts: ASTM A489.
- G. Machine Screws: ASME B18.6.3.
- H. Lag Screws: ASME B18.2.1.
- I. Wood Screws: Flat head, ASME B18.6.1.
- J. Plain Washers: Round, ASME B18.22.1.
- K. Lock Washers: Helical, spring type, ASME B18.21.1.

- L. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- M. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

## 2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Non-shrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C1107, specifically recommended by manufacturer for heavy-duty loading applications.
- 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.
- G. Concrete: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

## 2.6 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 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 or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least 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; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

## 2.7 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.
1. Fabricate units from slotted channel framing where indicated.
  2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

## 2.8 METAL LADDERS

- A. General:
1. Comply with ANSI A14.3 and Cal-OSHA unless otherwise indicated.
- B. Aluminum Ladders: Tubular Rail Low Parapet Access Ladder with Walk-through Rail Extension
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. O'Keeffe's Inc.; Model 504

- b. ACL Industries, Inc.
- c. Alco-Lite Industrial Products.
- d. Halliday Products.
- e. Precision Ladders, LLC.
- f. Royalite Manufacturing, Inc.
- g. Thompson Fabricating, LLC.

- 2. Space siderails 24 inches apart unless otherwise indicated.
- 3. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4 inch wide, and 1/8 inch thick.
- 4. Rungs: Extruded-aluminum tubes, not less than 3/4 inch deep and not less than 1/8 inch thick, with ribbed tread surfaces.
- 5. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.
- 6. Provide Walk-through Rail Extensions fabricated from same materials as Siderails.
- 7. Support each ladder with welded or bolted aluminum brackets.

## 2.9 METAL FLOOR PLATE

- A. Fabricate from rolled-steel floor plate of thickness indicated below:
  - 1. Thickness: As indicated.

## 2.10 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
  - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime interior miscellaneous steel trim with zinc-rich primer.

## 2.11 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe.
  - 1. Cap bollards as indicated on drawings.
  - 2. Where bollards are indicated to receive controls for door operators, provide necessary cutouts for controls and holes for wire.
  - 3. Where bollards are indicated to receive light fixtures, provide necessary cutouts for fixtures and holes for wire.
  - 4. Where removable bollards are indicated, fabricate hardware to facilitate locking bollard in place as indicated on drawings.
- B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- thick steel plate welded to bottom of sleeve. Make sleeves not less than 36 inches deep and 3/4 inch larger than OD of bollard.

- C. Galvanize bollards.

2.12 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.

2.13 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 no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.14 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.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.15 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.
  - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
  - 1. Shop prime with universal shop primer unless zinc-rich primer is indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
  - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 3. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to 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.

2.16 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

- B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

### PART 3 - EXECUTION

#### 3.1 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 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.
- 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 screws, 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.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
  - 1. Cast Aluminum: Heavy coat of bituminous paint.
  - 2. Extruded Aluminum: Two coats of clear lacquer.

#### 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported as indicated on drawings and including manufacturers' written instructions and requirements indicated on Shop Drawings as submitted to and approved by Architect.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure as detailed on drawings.

#### 3.3 INSTALLING METAL BOLLARDS

- A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

- B. Anchor pipe sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches above bottom of excavation or provide machine thru bolt stop as detailed on drawings. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.
- C. Fill bollards solidly with concrete and provide finished cap to shed water.
  - 1. Do not fill removable bollards with concrete.

### 3.4 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
  - 1. Use non-shrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use non-shrink, nonmetallic grout in exposed locations unless otherwise indicated.
  - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### 3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

**END OF SECTION 05 50 00**



**SECTION 05 51 13 - METAL PAN STAIRS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Preassembled steel stairs with concrete-filled treads.
- 2. Steel tube railings and guards attached to metal stairs.
- 3. Steel tube handrails attached to walls adjacent to metal stairs.

B. Related Requirements:

- 1. Section 03 30 00 "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
- 2. Section 05 40 00 "Cold-Formed Metal Framing" for metal backing for anchoring railings.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs. 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.
- C. Coordinate locations of hanger rods and struts with other work so that they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.
- D. 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.

1.4 SUBMITTALS

A. Product Data: For metal pan stairs and the following:

- 1. Perforated metal
- 2. Shop Primer products.
- 3. Grout.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Uniform Load: 100 lbs/sq. ft.
  - 2. Concentrated Load: 300 lbs. applied on an area of 2 inches by 2 inches.
  - 3. Uniform and concentrated loads need not be assumed to act concurrently.
  - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
  - 5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- B. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lb/ft. applied in any direction along the handrail or top rail.
    - b. Concentrated load of 200 lb applied in any direction at any point.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 50 lb applied horizontally on an area not to exceed 12 inches by 12 inches.
    - b. Infill load and other loads need not be assumed to act concurrently.
- C. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. Component Importance Factor: 1.5.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36.
- C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A513.
- D. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, structural steel, Grade 30.

- E. Custom Perforated Metal (Risers as shown on approved drawings): Cold-rolled steel sheet, ASTM A1008, or hot-rolled steel sheet, ASTM A1011, commercial steel Type B, 10 gauge thick with pattern shown on approved drawings.
- F. Custom Perforated Metal (Guard Assembly): Cold-rolled steel sheet, ASTM A1008, or hot-rolled steel sheet, ASTM A1011, commercial steel Type B, ¼ inch thick with pattern shown on approved drawings.

### 2.3 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
- D. Expansion Anchors: Current ICC-ES evaluation report or other acceptable evaluation report meeting the requirements of DSA IR A-5. Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to 2019 CBC, section 1905A; ICC-ES AC193 and ACI 318-14, greater than or equal to the design load, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

### 2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- D. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
  - 1. Minimum Compressive Strength: 7500 psi at 28 days.
- E. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
- F. Welded Wire Reinforcement: ASTM A185/A185M, 6 by 6 inches, W2.9 by W2.9, unless otherwise indicated.

**2.5 FABRICATION, GENERAL**

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
  - 1. Join components by welding unless otherwise indicated.
  - 2. Use connections that maintain structural value of joined pieces.
- B. Preassembled Stairs: Assemble stairs, railings, and guards in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. 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.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections 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. Weld exposed corners and seams continuously unless otherwise indicated.
  - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: partially dressed weld with spatter removed.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

**2.6 STEEL-FRAMED STAIRS**

- A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
  - 1. Fabricate stringers of steel channels and tubes as shown on the approved drawings.
  - 2. Construct platforms of steel tube headers and miscellaneous framing members as indicated.
  - 3. Weld stringers to headers; weld framing members to stringers and headers
- C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness indicated.
  - 1. Steel Sheet: Uncoated hot-rolled steel sheet unless otherwise indicated.
  - 2. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding.

3. Shape metal pans to include nosing integral with riser.
4. Provide sub-platforms of configuration indicated.

## 2.7 STAIR RAILINGS AND GUARDS

- A. Fabricate railings and guards to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage.
  1. Custom Perforated-Metal Panels: Perforated metal panels shall be edged top and bottom with 2-inch-wide non-perforated band as shown on the approved drawings. The perforations shall be custom cut (plasma, laser, or water jet) through the steel in the pattern shown on the approved drawings. The perforations shall have not sharp edges or burrs that could cut a person.
- B. Welded Connections: Fabricate railings and guards with welded connections.
  1. Cope components at connections to provide close fit, or use fittings designed for this purpose.
  2. Weld all around at connections, including at fittings.
  3. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  4. Obtain fusion without undercut or overlap.
  5. Remove flux immediately.
  6. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint as shown in NAAMM AMP 521.
- C. Form changes in direction of railings as follows:
  1. By bending or by inserting prefabricated elbow fittings.
- D. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- G. Connect posts to stair framing by direct welding unless otherwise indicated.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
  1. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
  2. Provide type of bracket indicated on the approved drawings and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.
- I. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to

suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

## 2.8 FINISHES

- A. Finish metal stairs after assembly.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete 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.

## PART 3 - EXECUTION

### 3.1 INSTALLING METAL PAN STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. 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.
- F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- G. Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 "Cast-in-Place Concrete."

### 3.2 INSTALLING RAILINGS AND GUARDS

- A. Adjust railing systems and guard systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
  - 1. Space posts at spacing indicated or, if not indicated, as required by design loads.
  - 2. Plumb posts in each direction, within a tolerance of 1/16 inch in 3 feet.
  - 3. Align rails in each direction so variations from level for horizontal members and variations from parallel with rake of stairs for slopping members do not exceed ¼ inch in 12 feet.
  - 4. Secure posts, rail ends, and guard ends to building construction as follows:
    - a. Anchor posts to steel by welding to steel supporting members.

- B. Attach handrails to wall with wall brackets. Locate brackets as indicated. Secure wall brackets to building construction as follows:
  - 1. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

### 3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

**END OF SECTION 05 51 13**

**SECTION 05 52 13 - PIPE AND TUBE RAILINGS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Steel pipe and tube railings.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

- 1. Handrails and Top Rails of Guardrails:

- a. Uniform load of 50 lbf/ ft. applied in any direction.
- b. Concentrated load of 200 lbf applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

- 2. Infill of Guardrails (intermediate rails (all those except handrail), balusters, and panel fillers):

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
- b. Infill load and other loads need not be assumed to act concurrently.

- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

- A. Product Data: For the following:

- 1. Grout, anchoring cement, and paint products.
- 2. Mill certificates for Steel Pipe or Tubing.

- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

- C. Welding certificates.



1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code - Steel."

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.2 STEEL AND IRON

- A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- B. Pipe: ASTM A 53, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are indicated.
  - 1. Provide galvanized finish for exterior installations and where indicated.
- C. Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Non-shrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Anchoring Cement: Factory-packaged, non-shrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

#### 2.4 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. 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.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Connections: Fabricate railings with welded connections unless otherwise indicated.
- G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  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 flux immediately.
  4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- H. Form changes in direction as follows:
  1. By bending or by inserting prefabricated elbow fittings.
- I. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- J. Close exposed ends of railing members with prefabricated end fittings.

#### 2.5 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations

in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.6 STEEL AND IRON FINISHES

- A. Galvanized Railings:
  - 1. Hot-dip galvanize steel and iron railings, including hardware, after fabrication.
  - 2. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
  - 3. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- C. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- E. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

### 3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

**3.3 ANCHORING POSTS**

- A. Form or core-drill holes not less than 8 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

**3.4 ATTACHING RAILINGS**

- A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.
- C. Attach railings to wall with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
  - 1. Use type of bracket with predrilled holes for exposed bolt anchorage.
  - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure wall brackets and railing end flanges to building construction as follows:
  - 1. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

**3.5 ADJUSTING AND CLEANING**

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

**3.6 PROTECTION**

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

**END OF SECTION 05 52 13**

**SECTION 06 10 00 – ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nonstructural dimension lumber framing.
- B. Roof-mounted curbs.
- C. Roofing nailers.
- D. Roofing cant strips.
- E. Preservative treated wood materials.
- F. Fire retardant treated wood materials.
- G. Miscellaneous framing and sheathing.
- H. Communications and electrical room mounting boards.
- I. Concealed wood blocking, nailers, and supports.
- J. Miscellaneous wood nailers, furring, and grounds.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.
- B. Section 07 72 00 - Roof Accessories: Prefabricated roof curbs.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- C. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing 2010 (Reapproved 2017).
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- E. AWPA U1 - Use Category System: User Specification for Treated Wood 2018.
- F. PS 1 - Structural Plywood 2009.
- G. PS 2 - Performance Standard for Wood-Based Structural-Use Panels 2010.
- H. PS 20 - American Softwood Lumber Standard 2020.
- I. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.
- J. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.
- K. WWPA G-5 - Western Lumber Grading Rules 2017.

**1.04 SUBMITTALS**

- A. See General Conditions, Article 3, Sections 3.7 and 3.9- Submittals, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Samples: For rough carpentry members that will be exposed to view, submit two samples, 4 by 6 inch in size illustrating wood grain, color, and general appearance.

- D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

### **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, and installation.

## **PART 2 PRODUCTS**

### **2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
  - 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
  - 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at [www.alsc.org](http://www.alsc.org), and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

### **2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS**

- A. Grading Agency: West Coast Lumber Inspection Bureau; WCLIB (GR) and Redwood Inspection Service; RIS (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Species: Douglas Fir-Larch, Redwood, or Western Cedar (Redwood and Western Cedar shall be used as nailers in Continuous Insulation Assemblies associated with Exterior Cement Plaster, unless otherwise noted or shown in approved details.)
  - 2. Lumber: S4S, No. 1 or Construction Grade.
  - 3. Boards: Standard or No. 3.

### **2.03 EXPOSED BOARDS**

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (15 percent maximum).
- C. Surfacing: S4S.
- D. Species: Douglas Fir.
- E. Grade: No. 1, 1 Common, or Select.

### **2.04 CONSTRUCTION PANELS**

- A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- B. Other Applications:

1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
3. Other Locations: PS 1, C-D Plugged or better.

## **2.05 ACCESSORIES**

### **A. Fasteners and Anchors:**

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

## **2.06 FACTORY WOOD TREATMENT**

### **A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.**

1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
2. 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 AWWA standards.

### **B. Fire Retardant Treatment:**

1. Exterior Type: AWWA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, 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 D2898.
  - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
  - b. Do not use treated wood in direct contact with the ground.
2. Interior Type A: AWWA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended 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. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
  - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
  - b. Treat lumber exposed to weather.
  - c. Treat lumber in contact with masonry or concrete.
  - d. Treat lumber in other locations as indicated.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Coordinate installation of rough carpentry members specified in other sections.

### **3.02 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.03 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

### **3.04 ROOF-RELATED CARPENTRY**

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at each roof opening except where prefabricated curbs are specified and where specifically indicated otherwise; form corners by alternating lapping side members.

### **3.05 INSTALLATION OF CONSTRUCTION PANELS**

- A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
  - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
  - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 3. Install adjacent boards without gaps.
  - 4. Size and Location: As indicated on drawings.

### **3.06 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

### **3.07 TOLERANCES**

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

### **3.08 CLEANING**

- A. Waste Disposal: See Section 01 50 13 - Construction Waste Management and Disposal.
  - 1. Comply with applicable regulations.
  - 2. Do not burn scrap on project site.
  - 3. Do not burn scraps that have been pressure treated.



- 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.
- B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**

**SECTION 06 20 23 - INTERIOR FINISH CARPENTRY**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Interior running and standing trim.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
  - 2. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
  - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
  - 4. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.
- B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- C. Samples for Verification:
  - 1. For each species and cut of lumber and panel products with non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. for lumber and 8 by 10 inches for panels.
  - 2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.
- D. Evaluation Reports: For fire-retardant-treated wood, from ICC-ES.
- E. Sample Warranty: For manufacturer's warranty.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than

installation areas, store only where environmental conditions meet requirements specified for installation areas.

#### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and the following grading rules:
  - 1. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
  - 2. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."
- B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
  - 1. For exposed lumber, mark grade stamp on end or back of each piece.
- C. Softwood Plywood: DOC PS 1.
- D. Woodworking Standard: Where indicated for a specific product comply with specified provision of the following: Woodwork Institute (WI) "Manual of Millwork."
  - 1. Woodwork Institute (WI) "Manual of Millwork."
- E. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

#### 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2.
  - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent respectively.
  - 2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  - 3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
  - 4. Do not use material that is warped or does not comply with requirements for untreated material.
  - 5. Mark lumber with treatment-quality mark of an inspection agency approved by the American Lumber Standard Committee's Board of Review.

- a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
  - a. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.
7. Application: Where indicated.

### 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: For applications indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction, and comply with testing requirements; testing by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent respectively.
- C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not contain colorants, and provide materials that do not have marks from spacer sticks on exposed face.
- D. Do not use material that does not comply with requirements for untreated material or is warped or discolored.
- E. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
  1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
  2. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.
- F. Application: Where indicated.

### 2.4 INTERIOR TRIM

- A. Lumber Trim for Opaque Finish (Painted Finish):
  1. Species and Grade: Alder; B Finish; NHLA.
  2. Maximum Moisture Content: 10 percent.
  3. Finger Jointing: Allowed.
  4. Face Surface: Surfaced (smooth).
  5. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

**2.5 MISCELLANEOUS MATERIALS**

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- C. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.
- D. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

**2.6 FABRICATION**

- A. Kerf backs of the following members except those with ends exposed in finished work:
  - 1. Interior standing and running trim except shoe and crown molds.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

**3.3 INSTALLATION, GENERAL**

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
4. Install stairs with no more than 3/16-inch variation between adjacent treads and risers and with no more than 3/8-inch variation between largest and smallest treads and risers within each flight.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

### 3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
  1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
  2. Install trim after gypsum-board joint finishing operations are completed.
  3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

### 3.5 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

### 3.6 CLEANING

- A. Clean interior finish carpentry on exposed and semi-exposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.

### 3.7 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
  1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

**END OF SECTION 06 20 23**

**SECTION 06 41 16 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Plastic-laminate countertops.
3. Solid-surface-material countertops.
4. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:

1. Section 05 40 00 "Cold-Formed Metal Framing" for metal stud backing concealed within other construction before cabinet installation.
2. Section 05 50 00 "Metal Fabrications" for steel framing and support of countertops.
3. Section 06 10 00 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 SUBMITTALS

- A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, and cabinet hardware and accessories.

B. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For composite wood products:
  - a. Hardwood plywood, particleboard, and medium density fiberboard composite wood products shall meet the requirements for formaldehyde as specified in California Air Resources Board's (ARB) Air Toxics Control Measure (ATCM) for Composite Wood (CCR Title 17, Section 93120, et seq.) Materials not exempted under the ATCM must meet the specified emission limits as shown in GBC Table 5.504.4.5.

- C. Shop Drawings: Show location of each item, dimensioned plans, elevations, and sections, large-scale details, attachment devices, and other components.

1. Submit shop drawings in conformance with the requirements of North American Architectural Woodwork Standards.
2. Drawings indicate form and profile concept only. Submit shop drawings to illustrate Fabricator's understanding of Drawings and to show intended fabrication details. A photocopy or traced copy of Drawings is not acceptable for shop drawings.
3. Prepare shop drawings using field verified dimensions. Report any major discrepancies between Drawings and field dimensions before fabrication of work.

4. For the initial review submit two copies of shop drawings to Architect (11 inch by 17 inch minimum size.) PDF's are acceptable for initial review.
5. Show details full size.
6. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
7. Show anchoring and attachment method and coordinate with details shown on the Drawings.
8. Show method of scribing.
9. Coordinate dimensions of built-in equipment and fixtures.
10. Show casework hardware indicating brand name and model used.
11. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
12. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, electrical switches and outlets, and other items installed in plastic-laminate countertops.
13. Show special accessory components not included in manufacturer's product data.
14. Apply WI Certified Compliance Program label to Shop Drawings.

D. Samples for Verification:

1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
2. Wood-grain plastic laminates, 12 by 24 inches, for each type, pattern and surface finish, with one sample applied to core material and specified edge material applied to one edge.
3. Thermoset decorative panels, 8 by 10 inches, for each color, pattern, and surface finish, with edge banding on one edge.
4. Solid-surface-material, 6 inches square for each color.
5. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Qualification Data: For Installer and Fabricator.

F. Product Certificates: For each type of product.

G. Woodwork Quality Standard Compliance Certificates: Woodwork Institute (WI) Certified Compliance Program certificates.

1. Before delivery to the jobsite the woodwork supplier shall provide a Woodwork Institute Certified Compliance Certificate indicating the millwork products being supplied and Certifying that these products fully meet the requirements of the Grade or Grades specified.
2. Each elevation of casework, each laminated top, and each solid surface top shall bear a Woodwork Institute Certified Compliance Label.
3. At completion of installation the woodwork installer shall provide a Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
4. All fees charged by the Woodwork Institute for their Certified Compliance program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.

#### 1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a licensee of WI's Certified Compliance Program.



- B. Installer Qualifications: Fabricator of products or Licensee of WI's Certified Compliance Program.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets and countertops until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets and countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- B. Cabinets and countertops shall acclimate in spaces where they will be installed a minimum of 72 hours before installation.

#### 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets and countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where cabinets and countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support cabinets and countertops by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets and countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

#### 1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

### PART 2 - PRODUCTS

#### 2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
  - 1. Provide labels and certificates from WI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
  - 2. Number designations on plans refer to WI Casework Design Series (CDS) numbers in Appendix A of the latest North American Architectural Woodwork Standards (NAAWS).
  - 3. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

- B. Grade: Custom.
- C. Construction Style: A – Frameless.
- D. Construction Type: Type I – Multiple Self-Supporting Units.
- E. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- F. Core Thickness: 3/4 inch, unless otherwise noted.
- G. Shelves: Conform to NAAWS requirements, subject to a 50 psf uniformly spaced load not to exceed 200 pounds per shelf.
  - 1. Shelves deeper than 24 inches shall have three supports at each end of shelf.
  - 2. Shelves greater than 24 inches in length shall be at least 1-inch thick. Refer to North American Architectural Woodwork Standards for length limitations of 1-inch thick material and utilize appropriate shelf material for length of cabinets detailed and shown on drawings.
- H. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Wilsonart International; Div. of Premark International, Inc. (Upper Cabinets and Restroom Sink Aprons)
    - b. FENIX NTM, a division of the Formica Corporation. (Base Cabinets)
- I. Laminate Cladding for Exposed Surfaces:
  - 1. Horizontal Surfaces: Grade HGS.
  - 2. Postformed Surfaces: Grade HGP.
  - 3. Vertical Surfaces: Grade HGS.
  - 4. Edges: Grade HGS.
  - 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- J. Materials for Semiexposed Surfaces:
  - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
    - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12-inch-thick, matching laminate in color, pattern, and finish.
    - b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
    - c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade CLS.
  - 2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
  - 3. Drawer Bottoms: Thermoset decorative panels, 1/2 inch thick (minimum).
- K. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

- L. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- M. Drawer Construction:
  - 1. Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
  - 2. Acceptable Joinery Methods:
    - a. Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure.
    - b. Doweled, glued under pressure.
    - c. Lock shoulder, glued and pin nailed.
    - d. Bottoms shall be set into sides, front, and back, 1/4-inch-deep groove, with a minimum 3/8-inch standing shoulder.
  - 3. File Drawers: Unless otherwise indicated, direction of file folder shall be parallel to drawer door. Provide adequate, clear inside dimensions for hanging file folders. Minimum clear inside drawer dimensions shall be as follows:
    - a. Letter size file folders: Minimum 13- $\frac{1}{4}$  inch wide by 10- $\frac{1}{2}$  inch high.
    - b. Legal size file folders: Minimum 16- $\frac{1}{4}$  inch wide by 10- $\frac{1}{2}$  inch high.
- N. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. As selected by Architect from laminate manufacturer's full range in the following categories:
    - a. Solid colors, matte finish.
    - b. Wood grains, matte finish.
    - c. Patterns, matte finish.

## 2.2 SOLID-SURFACE-MATERIAL COUNTERTOPS

- A. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. LX Hausys
    - b. Architect and District approved equal.
  - 2. Type: Provide Standard Type.
  - 3. Colors and Patterns:
    - a. Reception Countertop: Nordic White S214
    - b. Restrooms: Aurora Linen
    - c. Kitchenette & Breakroom: Aurora Merino
- B. Configuration: Provide countertops with the following front and backsplash style:
  - 1. Front: Radius edge with apron, 1  $\frac{1}{2}$ " inches high with 3/8-inch radius.
  - 2. Backsplash: None.

3. Endsplash: None.

C. Countertops: 1/2-inch- thick, solid surface material with front edge built up with same material.

## 2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.

2. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde or Grade M-2-Exterior Glue (where called for in other areas of the specifications or on the drawings.)

3. Softwood Plywood: DOC PS 1, medium-density overlay.

4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

## 2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Butt Hinges: 2-3/4-inch, five-knuckle, grade 1 steel hinges made from 0.095-inch- thick metal, and as follows:

1. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521. Equal to RPC; #374-P28-B; Chrome Powder Coat Finish.

C. Steel Wire U-Pulls (fully accessible): Back mounted, steel, 5 inches long, 1-1/2 inches deep, and 5/16 inch in diameter. Finish: Nickle-Plated Matte

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. Adjustable Shelf Standards and Supports (Display Cabinets and where called for on drawings): BHMA A156.9, B04102; with shelf brackets, B04112.

F. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip. Equal to Vasa #2-7875-104

G. Drawer Slides: BHMA A156.9.

1. Grade 1: Side mounted full-extension type; zinc-plated steel with polymer rollers. Equal to Accuride Model 2632.

2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides. Equal to Accuride Model 7432 (Grade 1HD-100) and Accuride Model 3640 (Grade 1HD-200).

3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
  4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
  5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
  6. For computer keyboard shelves, provide Grade 1HD-100.
  7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-200.
- H. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.
- I. Cabinet Locks: Cabinet Locks with Interchangeable Cores (IC) shall be keyed to the room entrance lock with Schlage "Primus" System, Security Level Three, Type EP keyways per Final Keying System described in Specification Section 08 71 00 "Finish Hardware."
1. Door Locks: BHMA A156.11, Grade 1. Equal to Schlage Cabinet Deadbolt Locks; CL774R with Full Size IC; 626 Satin Chrome Finish.
  2. Drawer Locks: BHMA A156.11, Grade 1. Equal to Schlage Drawer Deadbolt Locks; CL874R with Full Size IC; 626 Satin Chrome Finish.
  3. Showcase Locks: Equal to Schlage Ratchet Locks; CL929R w/ Full Size IC; 626 Satin Chrome Finish.
- J. Door Silencers: BHMA A156.16, L03011. Drawer Silencers are not allowed. Closing stops for drawers are to be provided at the rear of the both drawer sides, unless closing stops are built into the slides to prevent drawer front from impacting the cabinet body.
- K. Grommets for Cable Passage through Countertops: 2-½ inch OD black, molded-plastic grommets and matching plastic caps with slot for wire passage.
- L. Ventilation Grills: Equal to Hafele; #571.54.248; 9 1/16 inches wide x 2 11/16 inches high by 8mm deep plastic air ventilation grill with flanged rim; color: chrome plated.
- M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- N. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
- 2.5 MISCELLANEOUS MATERIALS
- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
  - B. Toe Kicks: Wood-Preservative-Treated Lumber per Specification Section 06 10 00 "Rough Carpentry."
  - C. Anchors: Provide anchorage as indicated in drawings.
  - D. Adhesives: Do not use adhesives that contain urea formaldehyde.
- 2.6 FABRICATION
- A. Fabricate cabinets to dimensions, profiles, and details indicated.

- B. Fabricate countertops to dimensions, profiles, and details indicated. Provide units with smooth surfaces in uniform plane, free of defects. Provide front and end overhang of 1 inch over base cabinets.
- C. Fabricate solid-surface-material countertops and window sills in one piece with shop-applied edges unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
- D. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Before installation, condition cabinets and countertops to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets and countertops, examine shop-fabricated work for completion and complete work as required.

#### **3.2 INSTALLATION**

- A. Grade: Install cabinets and countertops to comply with same grade as item to be installed.
- B. Assemble cabinets and countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
  - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
  - 2. Seal edges of cutouts by saturating with varnish except at plumbing fixtures and areas subject to excessive moisture.
  - 3. Seal edges subject to excessive moisture with a color-toned (for verification), water-resistant sealer before trim or sink rims are installed.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
  - 1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten

according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

- D. Install cabinets and countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- E. Scribe and cut cabinets and countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. Anchor cabinets to anchors or blocking built in or directly attached to substrates as detailed on drawings.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
  - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
  - 3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
- H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  - 2. Fasten wall cabinets as detailed on the Drawings.
- I. Solid-surface-material countertops: Anchor securely to support structure as indicated on the drawings. Pre-drill holes for screws as recommended by manufacturer.
  - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  - 2. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

### 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets and countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean all installed items of pencil and ink marks and broom clean the area of operation, depositing debris in containers provided by the general contractor. Touch up shop-applied finishes to restore damaged or soiled areas.

**END OF SECTION 06 41 16**

**SECTION 06 22 00 - FLEXIBLE WOOD TAMBOUR PANELS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide flexible wood tambour panels of the following types:
  - 1. Solid wood tambours.
- B. Related Sections: Coordinate with the following as applicable:
  - 1. Section 06 41 00 – Plastic-Laminate-Faced Architectural Cabinets for other woodwork.
  - 2. Section 09 29 00 - Gypsum Board for substrate.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's literature including product characteristics and accessories.
- B. Shop Drawings: Submit diagram showing layout of pattern and configuration, including details of perimeter conditions and mounting.
- C. Verification Samples: Submit samples of materials selected for use to verify profile, color, and finish.

1.3 QUALITY ASSURANCE

- A. Manufacturer: Minimum of 5 years experience manufacturing similar products.
- B. Installer: Minimum of 2 years experience installing similar products.
- C. Field Measurements: To the greatest extent practical, take field measurements prior to fabrication.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design Manufacturer: Surfacing Solution, 2480 Chaska Blvd., Chaska, MN 55318. Tel 800.964-6727. Fax 800.964.0630. [www.SurfacingSolution.com](http://www.SurfacingSolution.com).

2.2 SOLID WOOD TAMBOUR PANELS

- A. Basis of Design: Solid Wood Tambour by Surfacing Solution.
  - 1. Nominal Sheet Width: 16 inches.
  - 2. Nominal Sheet Length: Available in 12 inch increments from 36 inches to 144 inches. Order in the length needed to minimize cutting and splicing.
  - 3. Species: Maple.
  - 4. Profiles:
    - a. T383: Slat width of 3/4 inches (19 mm) and height of 5/16 inches (7.9 mm).
  - 5. Field Finish: Stain and clear coat polyurethane.



PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions, approved submittals and in proper relationship to adjacent construction.
  - 1. Clean substrate of dirt and bond breaking substances prior to beginning installation.
  - 2. Acclimatize panels at the installation site for a minimum of 48 hours prior to installation.
  - 3. Roll tambour panels in accordance with manufacturer's instructions to properly space slats.
  - 4. Follow manufacturer's recommendations for adhesives and mounting devices.
  - 5. Replace damaged or defaced products prior to Substantial Completion.

3.3 CLEANING

- A. Clean surfaces to remove soiling, stains, dust, and dirt using materials acceptable to manufacturer.
- B. Leave installation area clean and free of residue and debris resulting from work of this Section.

END OF SECTION

**SECTION 07 16 00 - BELOW GRADE WATERPROOFING**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SECTION INCLUDES**

- A. Preparation of concrete surfaces to receive waterproofing membrane.
- B. Sealing of cracks and joints.
- C. Fluid applied waterproofing system, with prefabricated drainage composite or protection board at elevator pit walls and new basement perimeter walls.
- D. Pre-applied waterproofing system, with joint sealing tape, and other accessories at below grade horizontal surfaces under the slab or elevator pit.

**1.3 SUBMITTALS**

- A. Product Data:
  - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
  - 2. Manufacturer's installation instructions.
- B. Certifications:
  - 1. Manufacturer's certification that applicator is approved by manufacturer.
  - 2. Manufacturer's affidavit that materials used in Project contain no asbestos.
- C. Warranty: Submit a sample warranty identifying the terms and conditions stated in warranty.

**1.4 QUALITY ASSURANCE**

- A. Applicator Qualifications: Applicator shall be experienced in applying the same or similar materials and shall be specifically approved in writing by the membrane system manufacturer.
- B. Regulatory Requirements: Comply with applicable codes, regulations, ordinances, and laws regarding use and application of products that contain volatile organic compounds (VOC).

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials job site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact and legible with following information.
  - 1. Name of material.
  - 2. Manufacturer's stock number and date of manufacture.
  - 3. Material safety data sheet (MSDS).
- B. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheet (MSDS).

- C. Protect from damage from sunlight, weather, excessive temperatures and construction operations.
- D. Remove damaged material from the site and dispose of in accordance with applicable regulations.
- E. Do not double-stack pallets of waterproofing on the job site. Provide cover on top and all sides.
- F. Store drainage composite and protection board flat and off the ground. Provide cover on top and all sides.
- G. Protect waterproofing materials from freezing. In cool temperatures, store the material for several hours at room temperature to facilitate mixing and application.
- H. Sequence deliveries of materials to avoid delays, but minimize on-site storage.

#### 1.6 PROJECT CONDITIONS

- A. Perform Work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.
- B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive membrane waterproofing.
- C. Coordinate waterproofing Work with other trades to ensure adequate illumination, ventilation, and dust-free environment during application and curing of membrane. The applicator shall have sole right of access to the specified areas for the time needed to complete the application and allow the membrane to cure adequately.
- D. Protect adjoining surfaces not to be coated against damage or soiling. Protect plants, vegetation and animals which might be affected by waterproofing operations.
- E. Warn personnel against breathing of vapors and contact of material with skin or eyes. Wear applicable protective clothing and respiratory protection gear.
- F. Keep products away from spark or flame. Do not allow the use of spark producing equipment during application and until all vapors have dissipated. Post "NO SMOKING" signs.
- G. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

#### 1.7 WARRANTY

- A. Warrant the Work specified herein for two (2) years against becoming unserviceable or causing an objectionable appearance resulting from both defective or non-conforming materials and workmanship.

**PART 2 PRODUCTS**

**2.1 FLUID APPLIED WATERPROOFING SYSTEM**

A. Specifications are based on named manufacturer. Other manufacturers must have a minimum of five (5) years experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered.

1. Carlisle Coatings and Waterproofing Incorporated.
2. Grace Construction Products, W. R. Grace & Co.-Conn.

B. Waterproofing Membrane: Two (2) part, self-curing, synthetic rubber based material meeting or exceeding the performance requirements of ASTM C836 and other ASTM standards as indicated in the following table and conforming to W.R. Grace & Co. "Procor" waterproofing membrane.

1. Waterproofing Membrane Physical Properties, minimum:

<u>Property</u>	<u>Test Method</u>	<u>Typical Value</u>
Cured Film Thickness	ASTM D3767 Method A	1.5 mm (0.60 in.) nom
Solids Content	ASTM DI 644	100 percent
Flexibility , 180 degree	ASTM DI 970	Unaffected
Bend over 25 mm (1 in.)		
Mandrel at 32 degrees C (-25 degrees F)		
Elongation	ASTM D412	500 percent minimum
Peel Adhesion to Concrete	ASTM D903 Modified*	880 N/m (5 lbs./in.)

C. Accessory Products:

1. Prefabricated Drainage Composite: Shall be designed to promote positive drainage while serving as a protection course.

- a. Hydroduct ® 660 Drainage Composite for use on all horizontal surfaces.
- b. Hydroduct ® 220 Drainage Composite for use on all vertical surfaces.

2. Protection Board (Use only where prefabricated drainage composite is not used):

- a. Asphalt Hardboard: A pre-molded semi-rigid protection board consisting of bitumen, mineral core and reinforcement. Provide 3 mm (0.125 inch) thick hardboard on horizontal surfaces not receiving steel reinforced slab. Where steel reinforcing bars are to be used, apply two (2) layers of 3 mm (0.125 inch) thick hardboard or one (1) layer of 6 mm (0.25 inch) thick hardboard.
- b. Expanded Polystyrene: 25 mm (1 inch) thick for vertical applications with the following characteristics:
  - 1) Normal Density: 1.0 pcf<sup>3</sup>
  - 2) Thermal Conductivity, K factor: 0.24 at 40 degrees F, 0.26 at 24.
  - 3) 75 degrees F.
  - 4) Thermal Resistance, R-Value: 4 per 1 inch of thickness.

- D. Locations: Vertical below-grade retaining walls and walls that fall below grade 0'-0" and where shown on drawings.

## 2.2 PRE-APPLIED WATERPROOFING SYSTEM

- A. Specifications are based on named manufacturer. Other manufacturers must have a minimum of five (5) years experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered.
  - 1. Carlisle Coatings and Waterproofing Incorporated.
  - 2. Grace Construction Products, W. R. Grace & Co.
- B. Waterproofing Membrane: Composite sheet comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating. Membrane provides a continuous seal that resists water ingress and migration between the membrane and the structure. The waterproofing system shall conform to the following products as manufactured by W.R. Grace & Co.:
  - 1. Membrane: Robust membrane for horizontal use below concrete slabs complying with Preprufe 200.
  - 2. Tape: Self-adhesive, 8 inch wide strip applied to the surface of the membrane along the line of all concrete joints (application temperature range minus 25 degrees F to 86 degrees F. Product shall conform to Preprufe CJ Tape LT; or in hot climates (minimum 50 degrees F), use Preprufe CJ Tape HC.
  - 3. Sealing Membrane: For sealing around penetrations shall conform with Bituthene.
- C. Locations: Below grade horizontal surfaces under the slab, and where shown on drawings.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Before waterproofing work is started the all surfaces to be waterproofed shall be thoroughly examined for all deficiencies. Should deficiencies exist, the Architect shall be notified in writing and corrections made.

### 3.2 SURFACE PREPARATION

- A. Surfaces to which waterproofing is to be applied shall be thoroughly clean, dry and free from all surface contaminates or cleaning residue that may harmfully affect the adhesion of the membrane.
- B. Repair all cracks in accordance with manufacturer's instructions.

### 3.3 APPLICATION

- A. Priming: Shall be in accordance with membrane manufacturer's instructions.
- B. Apply waterproofing in accordance with membrane manufacturer's instructions.
- C. Liquid membrane waterproofing on vertical walls shall positively overlap turned up sheet membrane waterproofing from under slab as instructed by the manufacturer.
- D. Where shown or required, install specified perimeter drainage system as the first course of drainage composite immediately after membrane has cured on vertical surfaces. Install

## BELOW GRADE WATERPROOFING

manufacturer's recommended drainage composite or protection board/protection course on remainder.

**END OF SECTION 07 16 00**

**SECTION 07 21 00 - THERMAL INSULATION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Mineral-wool fiber board insulation for rainscreen applications
3. Glass-fiber blanket insulation.
4. Mineral-wool blanket insulation.
5. Loose-fill insulation.

B. Related Sections:

1. Section 03 52 16 "Lightweight Insulating Concrete Systems (LWIC)" for insulation specified as part of roofing construction.
2. Section 07 84 46 "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- C. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES and listed in TER 1303-04 – Attachment of Exterior Wall Coverings Through Foam Plastic Insulating Sheathing (FBIS) to Wood or Steel Wall Framing.

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 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 during installation.
- B. Protect foam-plastic board insulation as follows:
  1. Do not expose to sunlight except as necessary for period of installation and concealment.
  2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.

3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

## PART 2 - PRODUCTS

### 2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Building Solutions (www.building.dow.com).
    - b. Owens Corning (www.owenscorning.com).
  2. Type IV, 25 psi.
  3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

### 2.2 MINERAL WOOL FIBER BOARD INSULATION

- A. Mineral Wool Fiber Board Insulation: ASTM C612 Type IVB, non-combustible, lightweight, water repellent, rigid insulation board with rigid upper surface.
  1. Basis of Design Product: Subject to compliance with requirements, provide ROCKWOOL; CAVITYROCK or comparable products by one of the following:
    - a. Architect and District approved equal.
  2. Fire Performance:
    - a. Non-combustibility: per ASTM E136
    - b. Surface Burning Characteristics: ASTM E84
      - 1) Flame spread: 0.
      - 2) Smoke developed: 0.
  3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
  4. Thermal Resistance:
    - a. R value/1 inch at 75 °F: 4.3 h ft<sup>2</sup> °F/Btu to ASTM C518
  5. Water vapor permeance: 27.2 Perm minimum.
  6. Moisture sorption: 1% maximum to ASTM C1104
  7. Fungi resistance: Zero mold growth to ASTM C1338
  8. Corrosion resistance:



- a. Steel to ASTM C665: Pass.
  - b. Stainless steel to ASTM C795: Pass.
9. Size: 16 inches or 24 inches by 48 inches
  10. Thickness: 1.5 inches (R-6.45)
  11. Weight: 4.4 lbs./ft<sup>3</sup> to ASTM C303.

B. Mechanical Fasteners:

1. #12 stainless steel self-drilling/self-tapping sheet metal screw w/ 2" diameter stainless steel insulation washer.

2.3 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.4 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Roxul Inc.
4. Thermafiber.

B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.5 LOOSE-FILL INSULATION

A. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type I for pneumatic application or Type II for poured application; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

2.6 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated, but are not limited to, into the Work:

- a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
  - b. Gemco; Spindle Type.
2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
  3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.
- B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated, but are not limited to, into the Work:
    - a. AGM Industries, Inc.; RC150.
    - b. Gemco; R-150.
  2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
    - a. Ceiling plenums.
    - b. Attic spaces.
- C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated, but are not limited to, into the Work:
    - a. AGM Industries, Inc.; TACTOO Adhesive.
    - b. Gemco; Tuff Bond Hanger Adhesive.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

#### 3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

**3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION**

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation with edges butted tightly in both directions. Press units firmly against inside substrates.
- C. Mineral Wool Fiber Board Insulation: Per manufacturer's written instructions, mechanically attach each piece of insulation board through vapor-permeable air barrier and sheathing substrate into the steel stud framing with a minimum of five #12 stainless steel self-drilling/self-tapping sheet metal screws with 2" diameter stainless steel washers. Screws shall be long enough to penetrate through the installation board, the sheathing, and extend at least 3 full threads past the flange of the steel studs.
- D. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- E. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
- F. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
  - 1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
  - 2. Spray Polyurethane Insulation: See Section 07 21 19 "Foamed-In-Place Insulation."

**3.4 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION**

- A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches up either side of partitions.

**3.5 PROTECTION**

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.6 INSULATION SCHEDULE

- A. Insulation Type Keynote #07 21 00.A6 (R-13): Unfaced, glass-fiber blanket insulation.
- B. Insulation Type Keynote #07 21 00.A13 (R-21): Unfaced, glass-fiber blanket insulation.
- C. Insulation Type Keynote #07 21 00.B3 (R-7.5 minimum, 1 1/2-inch-thick): Type IV extruded-polystyrene board insulation or foil-faced, polyisocyanurate board insulation.
- D. Insulation Type Keynote #07 21 00.C3 (R-6.45, 1 1/2-inch-thick): Mineral wool fiber board insulation.

**END OF SECTION 07 21 00**

**SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Closed-cell spray polyurethane foam.
- B. Related Requirements:
  - 1. Section 07 21 00 "Thermal Insulation" for foam-plastic board insulation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM (Keynote #07 21 00.A11)

- A. Closed-Cell Spray Polyurethane Foam: ASTM C 1029, Type II, minimum density of 1.5 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. BASF Corporation; Spraytite.
    - b. CertainTeed Corporation; CertaSpray Closed Cell Foam.
    - c. Dow Chemical Company (The); STYROFOAM Spray Polyurethane Foam Insulation.
    - d. Gaco Western LLC; GACOWALLFOAM 183M.
    - e. Henry Company; Permax 2.0.
    - f. Icynene Inc.; ICYNENE MD-C-200.

- g. Johns Manville; a Berkshire Hathaway company; JM Corbond MCS.
- 2. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - a. Flame-Spread Index: 25 or less.
  - b. Smoke-Developed Index: 450 or less.

## 2.2 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

### 3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Miscellaneous Voids: Install into cavities and voids formed by framing members where indicated on the approved drawings. Apply according to manufacturer's written instructions.

### 3.3 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

**END OF SECTION 07 21 19**

**SECTION 07 24 19 – EIFS**

**PART 1 GENERAL**

**1.01 SUMMARY**

A. Section Includes:

1. This document is to be used in preparing specifications for an Exterior Insulation and Finish System (EIFS) with Moisture Drainage including:
  - a. Coated fiberglass mat gypsum sheathing board panel with integral weather-resistant barrier and air barrier compatible with the adhesive application of the EIFS system.
  - b. Accessory materials required for treating sheathing joints, fasteners, penetrations, rough openings, and material transitions compatible with the adhesive application of the EIFS system.
  - c. Joint sealants compatible with specified EIFS for use in all exterior envelope joint waterproofing.
  - d. Comprehensive single source limited system warranty inclusive of EIFS, sheathing panel, accessory materials and sealants.

B. Related Requirements:

1. 03 30 00 – Cast-in-place Concrete
2. 05 40 00 – Cold-formed Metal Framing
3. 06 16 00 – Sheathing
4. 07 62 00 – Sheet Metal Flashing and Trim
5. 07 92 00 – Joint Sealants
6. 08 41 13 – Aluminum Framed Entrances and Storefronts
7. 08 51 13 – Aluminum Windows

**1.02 REFERENCES**

A. Reference Standards:

1. ASTM Standards:
  - a. ASTM B 117 Standard Practice for Operating Salt Spray (Fog) Apparatus
  - b. ASTM C 150 Standard Specification for Portland Cement
  - c. ASTM C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
  - d. ASTM C 473 Standard Test Methods for Physical Testing of Gypsum Panel Products
  - e. ASTM C 510 Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants
  - f. ASTM C 518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  - g. ASTM C 639 Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants
  - h. ASTM C 661 Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
  - i. ASTM C 679 Standard Test Method for Tack-Free Time of Elastomeric Sealants

- j. ASTM C 719 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)<sup>1, 2</sup>
- k. ASTM C 793 Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants
- l. ASTM C 794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
- m. ASTM C 920 Standard Specification for Elastomeric Joint Sealants
- n. ASTM C 1063 Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement Plaster.
- o. ASTM C 1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
- p. ASTM C 1184 Standard Specification for Elastomeric Joint Sealants
- q. ASTM C 1246 Standard Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants After Cure
- r. ASTM C 1248 Standard Test Method for Staining of Porous Substrate by Joint Sealants
- s. ASTM C 1305 Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane
- t. ASTM C 1382 Standard Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints
- u. ASTM C 1396 Standard Specification for Gypsum Board
- v. ASTM C 1397 Standard Practice for Application of Class PB Exterior Insulation and Finish System (EIFS) and EIFS with Drainage
- w. ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
- x. ASTM D 624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
- y. ASTM D 968 Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
- z. ASTM D 1784 Standard Specification for Rigid PVC and CPVC Compounds
- aa. ASTM D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
- bb. ASTM D 2247 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
- cc. ASTM D 2898 Standard Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
- dd. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- ee. ASTM D 3330 Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape
- ff. ASTM D 4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
- gg. ASTM D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- hh. ASTM E 72 Standard Methods of Conducting Strength Tests of Panels for Building Construction



- ii. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
  - jj. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials
  - kk. ASTM E 119 Standard Method for Fire Tests of Building Construction and Materials
  - ll. ASTM E 283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
  - mm. ASTM E 330 Test Method for Structural Performance of Exterior Windows, Doors and Curtain Walls by Uniform Static Air Pressure Difference
  - nn. ASTM E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
  - oo. ASTM E 831 Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis
  - pp. ASTM E 1233 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Air Pressure Differential
  - qq. ASTM E 2098 Test Method for Determining the Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for use in Class PB Exterior Insulation and Finish Systems (EIFS), after Exposure to Sodium Hydroxide Solution
  - rr. ASTM E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of Exterior Insulation and Finish Systems (EIFS)
  - ss. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials
  - tt. ASTM E 2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
  - uu. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
  - vv. ASTM E 2430 Standard Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for use in Exterior Insulation and Finish Systems (EIFS)
  - ww. ASTM E 2485 Standard Test Method for Freeze-Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water-Resistive Barrier Coatings
  - xx. ASTM E 2486 Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
  - yy. ASTM E 2568 Standard Specification for PB Exterior Insulation and Finish Systems
  - zz. ASTM E 2570 Standard Test Method for Evaluating Water-Resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
  - aaa. ASTM G 154 Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
  - bbb. ASTM G 155 Standard Practice for Operating-Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials
2. National Fire Protection Association (NFPA) Standards:
- a. NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Source
  - b. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components

3. The American Association of Textile Chemists and Colorists:
  - a. AATCC 127-08 Water Resistance: Hydrostatic Pressure Test
4. US Federal Specifications
  - a. TT-S-001543A Sealing Compound: Silicone Rubber Base (for Calking, Sealing, and Glazing in Buildings and Other Structures)
  - b. TT-S-00230 Sealing Compound: Elastomeric Type, Single Component (for Calking, Sealing, and Glazing in Buildings and Other Structures)

### 1.03 ADMINISTRATIVE REQUIREMENTS

#### A. Pre-Construction Meetings

1. The EIFS installer shall coordinate with the General Contractor to schedule, invite and administer a pre-construction meeting including but not limited to the architect of record, consultant(s), EIFS, sheathing board, accessory materials and sealant manufacturer's representatives and the owner to assure required integration of products selected as specified herein and for proper sequencing, installation detailing and sealant color coordination.

#### B. Coordinate for related specification and integration of Required Materials as referenced in Section 2.02.B.1 and 2.02.C herein below.

#### C. Sequencing

1. Provide jobsite grading prior to installation of Exterior Insulation and Finish System with Moisture Drainage so that the system may be terminated at 8 in above grade or as required by code.
2. Coordinate installation of sheathing board and accessory materials, flashing, foundation waterproofing, roofing membrane, windows, doors, and other penetrations of the exterior walls to provide a continuous air and water-resistive membrane barrier.
3. Provide protection of rough openings before installing windows, doors, and other penetrations of the exterior walls.
4. Coordinate installation of windows and doors so air and water-resistive membrane barrier accessory materials, transitions, flashings, etc. are connected to them to provide a continuous barrier.
5. Install window and door head flashings immediately after windows and doors are installed.
6. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.
7. Install copings and sealants immediately after installation of the Exterior Insulation and Finish System with Moisture Drainage and when EIFS coatings are dry.
8. Attach penetrations through Exterior Insulation and Finish System to structural support and provide water-tight seals at penetrations.

### 1.04 ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

- A. Submit product data as required by Section 01 33 00, Administrative Requirements.
- B. Submit shop drawings for panelized EIFS with Moisture Drainage showing wall layout, connections, details, expansion joints, and installation sequence.
- C. Submit two (2) samples of the Exterior Insulation and Finish System with Moisture Drainage for each finish, texture, and color to be used on the project. Use the same tools and techniques proposed for the actual installation. Make the samples of sufficient size to accurately represent each color and texture being utilized on the project.
- D. Submit a current copy of the manufacturer's Trained Contractor Certificate for the system specified.

Submit Owner/Architect-requested test results verifying the performance of the Exterior Insulation and Finish System with Moisture Drainage.

E. Submit a copy of the manufacturer's installation details and application instructions.

**1.05 CLOSEOUT SUBMITTALS**

A. Submit a copy of the manufacturer's recommended maintenance and repair manual.

B. Submit a copy of the Exterior Insulation and Finish System with Moisture Drainage manufacturer's comprehensive single source limited warranty.

**1.06 QUALITY ASSURANCE**

A. Manufacturer's Qualifications:

1. A member in good standing of the EIFS Industry Members Association (EIMA).
2. Manufacture Exterior Insulation and Finish System with Moisture Drainage materials at a facility covered by a current ISO 9001:2015 and ISO 14001:2015 certification. Certification of the facility is done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).

B. Contractor Qualifications:

1. Knowledgeable in the proper installation of the Exterior Insulation and Finish System with Moisture Drainage.
2. Possess a current copy of the manufacturer's Trained Contractor Certificate for the system specified.
3. Successfully complete a minimum of three (3) projects of similar scope and scale to the specified project.

C. Insulation Board Manufacturer Qualifications:

1. Listed by EIFS Manufacturer, and capable of producing the Expanded Polystyrene (EPS) in accordance with the current EIFS Manufacturer's Specification for Insulation Board.
2. Subscribe to the Dryvit Third Party Certification and Quality Assurance Program.

D. Panel Fabricator Qualifications:

1. Experienced and competent in the fabrication of architectural wall panels.
2. Possess a current Outsulation Plus MD System Trained Contractor Certificate\* issued by Dryvit Systems, Inc.

E. Panel Erector Qualifications:

1. Experienced and competent in the installation of architectural wall panel systems.
2. Shall be:
  - a. The panel fabricator or
  - b. An erector approved by the panel fabricator or
  - c. An erector under the direct supervision of the panel fabricator.

F. Mock-Up:

1. Provide the owner/architect with a mock-up for approval.
  - a. Of suitable size as required to accurately represent the products being installed, as well as each color and texture to be utilized on the project.
  - b. Prepared with the same products, tools, equipment and techniques required for the actual applications. Use finish from the same batch that is being used on the project.

c. Available and maintained at the jobsite.

G. Regulatory Requirements:

1. Separate the EPS insulation board from the interior of the building by a minimum 15-minute thermal barrier.
2. Comply with local building codes for the use and maximum thickness of EPS insulation board.

H. Inspections:

1. Cooperate with independent, third-party inspectors when required by code or by contract documents.

**1.07 DELIVERY, STORAGE AND HANDLING**

- A. Deliver all Exterior Insulation and Finish System with Moisture Drainage components and materials to the job site in the original, unopened packages with labels intact.
- B. Inspect all Exterior Insulation and Finish System with Moisture Drainage components and materials upon arrival for physical damage, freezing or overheating. Do not use questionable materials.
- C. Store all Exterior Insulation and Finish System with Moisture Drainage components and materials at the jobsite in a cool, dry location, out of direct sunlight, protected from weather and other sources of damage. Maintain minimum and maximum storage temperature as stated in the product data sheets or specifications for the materials selected.
- D. Protect all products from inclement weather and direct sunlight.

**1.08 SITE CONDITIONS**

A. Ambient Conditions

1. Do not apply wet materials during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.
2. Verify the minimum air and wall surface temperatures at the time of application as stated in the product data sheets or specifications for the materials selected.
3. Maintain these temperatures with adequate air ventilation and circulation for a minimum of 24 hours (48 hours for specific Specialty Finishes) thereafter, or until the products are completely dry.

**1.09 WARRANTY**

A. Manufacturers' Limited EIF System Warranty

1. Manufacturer shall offer a limited material defect and labor to repair or replace defective material warranty stating the Products will be free from manufacturing defect and will perform as warranted in the manner specified for the stated term measured from the Date of Project Substantial Completion.
  - a. A pre-construction meeting, including representatives of the Manufacturer, the Applicator, the Owner, and the Consultant (if applicable), shall be required prior to installation of the Products.
  - b. The warranty is available upon written request.
2. The EIF system warranty shall additionally include the following for the term of the warranty or as specifically noted hereunder.
  - a. The EIF system warranty term shall be 20 years.
  - b. The EIFS will remain in a watertight condition when the EIFS is used in conjunction with approved Company Joinery and Sealants.
  - c. The EIFS will drain incidental moisture between the air/water-resistive barrier and the insulation board.

- 1) Remedy includes repair or replacement of any sheathing or framing member that is damaged as a result of the EIF system failing to drain incidental moisture between the secondary weather barrier and the insulation board.
- d. Finish will be UV fade resistant for 10 years, except for specially produced colors.
  - 1) Specially produced colors will be UV fade resistant for 5 years when high-performance colorants are used to formulate.
- B. Installer Warranty
  1. EIF system Installer shall provide a separate minimum 1-year warranty for all workmanship related to the proper installation and drainage performance of the EIFS application. Manufacturer shall not be responsible for workmanship associated with the installation of Exterior Insulation and Finish System with Moisture Drainage.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Manufacturers List:
  1. Dryvit Systems, Inc., One Energy Way, West Warwick, RI 02893, 800-556-7752, [www.dryvit.com](http://www.dryvit.com).
- B. Substitution Limitations:
  1. All components of the Outsulation Plus MD Securock ExoAir 430 System shall be supplied or obtained from Dryvit or its authorized distributors. Substitutions or additions of materials manufactured or supplied by others will void the system warranty.
- C. Product Options:
  1. Field Applied: The Outsulation Plus MD Securock ExoAir 430 System is applied to the substrate system in place.

### 2.02 DESCRIPTION

- A. System Description:
  1. The Dryvit Outsulation Plus MD Securock ExoAir 430 System is an Exterior Insulation and Finish System (EIFS) with Moisture Drainage; consisting of:
    - a. A Coated Fiberglass Mat Gypsum Sheathing with Integral Weather-Resistant Barrier and Air Barrier with accessory materials
    - b. Adhesive – installed in vertical ribbons to facilitate egress of incidental moisture
    - c. Expanded Polystyrene (EPS) insulation board
    - d. Base Coat
    - e. Reinforcing Mesh
    - f. Finish Coat
    - g. Sealants
- B. Materials:
  1. A Coated Fiberglass Mat Gypsum Sheathing Panel with Integral Weather-Resistant Barrier and Air Barrier and Accessory Materials:
    - a. Shall be Securock ExoAir 430 Panel as manufactured by USG Corporation.
    - b. Accessory Materials: Provide compatible accessory materials as required by project conditions for treating sheathing board joints, fastener heads, penetrations, rough openings, material transitions and flashing integration to produce a complete air barrier assembly.

- 1) Basis of Design: Dymonic® 100 - A high-performance, high-movement, single-component, medium-modulus, low-VOC, UV-stable, non-sag polyurethane sealant as manufactured by Tremco Incorporated.
2. Drainage Components:
  - a. Drainage Track UV treated PVC “J” channel perforated with weep holes, complying with ASTM D 1784 and ASTM C 1063.
  - b. Acceptable manufacturers of Drainage Track:
    - 1) Starter Trac STWP – without drip edge by Plastic Components, Inc.
    - 2) Starter Trac STDE – with drip edge by Plastic Components, Inc.
    - 3) Universal Starter Track by Wind-lock Corporation
    - 4) Sloped Starter Strip with Drip by Vinyl Corp.
  - c. Dryvit Drainage Strip™ corrugated plastic strip.
  - d. Dryvit AP Adhesive™ urethane-based adhesive used to attach Drainage Track and Dryvit Drainage Strip to the sheathing.
3. Adhesives:
  - a. Liquid polymer-based adhesive field mixed with Portland cement.
    - 1) Dryvit Primus®
    - 2) Dryvit Genesis®
  - b. Ready mixed dry blend cementitious, copolymer-based adhesive field mixed with water.
    - 1) Dryvit Primus® DM
    - 2) Dryvit Genesis® DM
    - 3) Dryvit Genesis® DMS
    - 4) Rapidry DM™ 35-50
    - 5) Rapidry DM™ 50-75
4. Insulation Board:
  - a. Expanded Polystyrene; minimum thickness 2 1/2 inches; meeting Dryvit Specification [DS131](#) and ASTM E 2430.
5. Base Coat:
  - a. Liquid polymer-based base coat field mixed with Portland cement.
    - 1) Dryvit Primus
    - 2) Dryvit Genesis
    - 3) Dryvit Dryflex
  - b. Ready mixed dry blend cementitious, copolymer-based base coat field mixed with water.
    - 1) Dryvit Primus DM
    - 2) Dryvit Genesis DM
    - 3) Dryvit Genesis DMS
    - 4) Rapidry DM 35-50
    - 5) Rapidry DM 50-75
    - 6) Dryvit NCB – Non-cementitious

6. Reinforcing Mesh:

- a. Open-weave, glass fiber fabric treated for compatibility with other system materials.

Reinforcing Mesh <sup>1</sup> /Weight oz/yd <sup>2</sup>	Minimum Tensile Strengths	EIMA Impact Classification	EIMA Impact Range in-lbs	Impact Test Results in-lbs
Standard - 4.3 (above 10'-0")	150 lbs/in	Standard	25-49	36
Standard Plus - 6 (above 10'-0")	200 lbs/in	Medium	50-89	56
Intermediate™ - 12	300 lbs/in	High	90-150	108
Panzer® 15 <sup>1</sup> - 15	400 lbs/in	Ultra High	>150	162
Panzer 20 <sup>1</sup> - 20.5	550 lbs/in	Ultra High	>150	352
Detail Mesh® Short Rolls - 4.3	150 lbs/in	n/a	n/a	n/a
Corner Mesh™ - 7.2	274 lbs/in	n/a	n/a	n/a

\* It shall be colored blue and bear the Dryvit logo for product identification

- 1. Shall be used in conjunction with Standard Mesh (recommended for areas exposed to high traffic)

7. Pre-Coated Insulation Starter Boards, Corners and Shapes:

- a. Machine Coated Starter Boards, Corners and Shapes: Shall be produced with materials approved by Dryvit Systems, Inc. and be supplied by a fabricator approved by Dryvit Systems, Inc.
- b. Non-Machine Coated Starter Boards, Corners and Shapes: Shall be produced with materials approved by Dryvit Systems, Inc.

8. Specialty Finishes and Veneers:

- a. Reflectit™ – acrylic coating providing a pearlescent appearance.
- b. Finesse – a smooth 100% acrylic-based dirt pickup resistance finish.

9. Coatings, Primers, and Sealants:

- a. Demandit® Smooth
- b. Demandit® Sanded
- c. Demandit® Advantage™
- d. HDP Water-Repellent Coating
- e. Weatherlastic® Smooth
- f. Tuscan Glaze™
- g. Color Prime
- h. Prymit®
- i. SealClear™

C. Joint Sealants:

- 1. Silicone Sealant: A non-sag, non-staining, neutral-curing silicone joint sealant as manufactured by Tremco Inc. Commercial Sealants and Waterproofing.
  - a. Spectrem 1: An ultra-low modulus, high-performance, one-part, moisture-curing silicone joint sealant with physical properties making it an ideal sealant for sealing dynamic joints.
  - b. Spectrem 3: A general-purpose, low-modulus, high performance, one-part, neutral-cure, non-staining, low dirt pickup, construction-grade silicone sealant.

- c. Spectrem 4-TS: A multi-component, neutral-curing, non-staining, low dirt pick up, low-modulus silicone sealant specially formulated for use in dynamically moving building joints. Spectrem 4-TS offers color flexibility with the opportunity to tint the material on site.
  - d. Coordination for custom sealant colors are required.
  - e. See related specification section or consult with Tremco, Inc. for more information.
- D. Jobsite-Mixed Materials:
1. Portland cement: verify is Type I or II, meeting ASTM C 150, white or gray in color, fresh and free of lumps.
  2. Water: verify is clean and free of foreign matter.
- E. Reference Documentation for Outsulation Plus MD Securock ExoAir 430 System:
1. Data Sheet – DS900
  2. Details – DS 903
  3. Application Instructions – DS901

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verification of Conditions:
1. Verify access to electric power, clean water and a clean work area at the location where the Dryvit materials are to be applied.
  2. Verify that wall surface on which Exterior Insulation and Finish System with Moisture Drainage is to be installed is Securock ExoAir 430 coated fiberglass mat gypsum sheathing panel with integral weather-resistant barrier and air barrier (USG Corporation).
  3. Verify the deflection of the substrate does not exceed 1/240 times the span. Verify substrate is flat within 1/4 in in a 4 ft radius.
  4. Verify substrate is sound, dry, connections are tight; has no surface voids, projections, or other conditions that may interfere with the Exterior Insulation and Finish System with moisture drainage installation or performance.
  5. Verify the slope of inclined surfaces are not less than 6:12 (27 °) where the length of the slope does not exceed 12 in or 3:12 (14 °) where the length of the slope does not exceed 4 inches.
  6. Verify metal roof flashings have been installed in accordance with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) standards.
  7. Verify all rough openings are flashed in accordance with the Exterior Insulation and Finish System with Moisture Drainage manufacturer's installation details, or as otherwise necessary to prevent water penetration. Verify chimneys, balconies and decks have been properly flashed as necessary to prevent water penetration.
  8. Verify windows and doors are installed and flashed per manufacturer's requirements and installation details.
  9. Notify general contractor of all discrepancies prior to the installation of the Exterior Insulation and Finish System with moisture drainage.
  10. Verify that expansion joints are installed:
    - a. Where expansion joints occur in the substrate system.
    - b. Where building expansion joints occur.
    - c. At floor lines of non-wood framed buildings where significant movement is expected.



- d. Where the Exterior Insulation and Finish System with moisture drainage abuts dissimilar materials.
- e. Where the substrate type changes.
- f. In continuous elevations at intervals not exceeding 75 ft.
- g. Where significant structural movement occurs, such as changes in roof line, building shape or structural system.

### 3.02 PREPARATION

- A. Coordinate for related specification and integration of Coated Fiberglass Mat Gypsum Sheathing Panel with Integral Weather-Resistant Barrier and Air Barrier and Accessory Materials as referenced in Section 2.02.B herein above and Sealants as referenced in Section 2.02.C herein above.
- B. Protect the Exterior Insulation and Finish System with Moisture Drainage materials by permanent or temporary means from inclement weather and other sources of damage prior to, during, and following application until completely dry.
- C. Protect adjoining work and property during installation of the Exterior Insulation and Finish System with Moisture Drainage.
- D. Prepare the substrate to be free of foreign materials, such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellants, moisture, frost, and any other condition that may inhibit adhesion.

### 3.03 INSTALLATION

- A. Install the system in accordance with ASTM C1397 and the Dryvit Outsulation Plus MD Secureck ExoAir 430 System Application Instructions, DS903. Apply base coat sufficient to fully embed the reinforcing mesh. The recommended method is to apply the base coat in two (2) passes.
- B. Apply sealant to base coat surface prepared in accordance with [DS153](#).
- C. Install high impact reinforcing mesh as specified at ground level, high traffic areas and other areas exposed to or susceptible to impact damage as designated on contract drawings.

### 3.04 SITE QUALITY CONTROL

- A. Exterior Insulation and Finish System with Moisture Drainage manufacturer assumes no responsibility for on-site inspections or application of its products.
- B. EIFS sub-contractor to certify in writing the quality of work performed relative to the substrate system, details, installation procedures, and as to the specific products used.
- C. EPS supplier, if requested, to certify in writing that the EPS meets the Exterior Insulation and Finish System with Moisture Drainage manufacturer's specifications.
- D. The sealant contractor, if requested, to certify in writing that the sealant application is in accordance with the sealant manufacturer's and the Exterior Insulation and Finish System with Moisture Drainage manufacturer's recommendations.

### 3.05 CLEANING

- A. Remove all excess Exterior Insulation and Finish System materials from the job site by the contractor in accordance with contract provisions and as required by applicable law.
- B. Leave all surrounding areas, where the Exterior Insulation and Finish System with Moisture Drainage has been applied, free of debris and foreign substances resulting from the EIFS sub-contractor's work.

END OF SECTION 07 24 19

**SECTION 07 26 50 – VAPOR EMISSION CONTROL SYSTEM**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Vapor Emission Control System: Provide vapor emission control system over new concrete slabs indicated to receive finished floor coverings, as follows:
  - 1. At concrete slabs indicated to receive resilient tile flooring.
  - 2. At new concrete slabs indicated to receive sheet and tile carpeting
  - 3. At concrete slabs indicated to receive ceramic tile installed per TCA F113A.
- B. Testing: Perform testing at new concrete slabs indicated to receive finished floor coverings, as specified above.
  - 1. Test concrete slabs for vapor emission, pH value, and relative humidity, as specified in this Section.

1.3 RELATED SECTIONS

- A. Section 03 30 00 "Cast-in-Place Concrete" for concrete substrate.
- B. Section 09 30 00 "Ceramic Tile"
- C. Section 09 65 00 "Resilient Flooring"
- D. Section 09 68 13 "Tile Carpeting."

1.4 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
  - 1. ASTM C1583 - Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
  - 2. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
  - 3. ASTM D7234 - Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
  - 4. ASTM E96-05 - Standard Test Methods for Water Vapor Transmission of Materials. Water Method Net perms (grains/hr/1 sq. ft.).
  - 5. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
  - 6. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

- 7. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- 8. ASTM F3010-13 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.

1.5 DEFINITIONS

- A. The System: Vapor emission control system specified in this Section referred to as “the System” in this Section for brevity.

1.6 SUBMITTALS

- A. General: Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Submittal Requirements: Submit product data, test reports, certificates, and manufacturer’s standard warranty.
- C. Submit independent laboratory testing on the system submitted for the following:
  - 1. E96-05 Water Method net perm rating not to exceed 0.10.
  - 2. ASTM D1308 14 day bath test (no effect on system at pH 14).
- D. Moisture, pH, and relative humidity test results of concrete slab, certified by a qualified testing agency.

1.7 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Installer Qualifications:
    - a. Installer shall be either manufacturer’s trained personnel; or manufacturer’s factory-trained and certified installer.
    - b. Installer shall have a minimum of 5 years experience in the installation of specified vapor emission control system and shall have worked on a minimum of 5 installations using the same system.
  - 2. Manufacturer Qualifications:
    - a. Minimum 10 years experience in manufacturing water vapor emission control systems, specifically formulated and used for reducing water vapor emissions, and alkalinity control in concrete slabs, without change of system formulation for a minimum period of 5 years at the time of application.
    - b. Experience in product application in similar projects requiring vapor emission control at new and existing concrete slabs.
    - c. Manufacturer shall provide independent laboratory test reports documenting performance of the System as follows:
      - 1) Standard Test Method for Water Vapor Transmission of Materials, ASTM E96-05 – Perm Rating Water Method: Perm Rate results must not exceed 0.1 Perms. Net perms (grains h-1 ft2 in Hg-1)
      - 2) Alkalinity Test, ASTM D1308: Insensitivity to alkaline environment up to pH 14 in a 14-day bath test with no effect or degradation of sample.
      - 3) Certify acceptance and exposure to continuous topical water exposure after final cure.

3. Testing Agency Qualifications: Qualified and experienced agency to perform Moisture, pH, relative humidity (RH), and vapor emission tests, as specified in this Section.

B. Environmental Requirements: The System 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."

#### 1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver products to the job site in manufacturer's original unopened containers, clearly labeled with the manufacturer's name and brand designation.

B. Store products in a ventilated dry area, protected from dampness, freezing, and direct sunlight. Products shall not be stored in areas with temperatures in excess of 90 degrees F or below 50 degrees F, or with humidity in excess of 80 percent.

#### 1.9 SITE CONDITIONS

A. Concrete Curing: New concrete shall be cured for a minimum period of 28 days.

B. Enclosures and Environmental Limitations:

1. Prior to testing concrete slabs for vapor emission rates, building shall be fully enclosed, and weather-tight. Interior wet work shall be completed and nominally dry, and work above ceilings completed. Test sites shall be maintained at the same temperature and humidity expected during normal building use.

2. If a system other than the permanent HVAC source is utilized, it must provide adequate control of both temperature and humidity to recommended or specific levels for the appropriate time duration.

3. Concrete slabs shall be fully protected, with no water accumulation on the surface.

4. The concrete substrate, the installation area and materials shall be maintained at 65 degrees F to 85 degrees F and 40% to 60% relative humidity for 48 hours before and for 48 hours after completion of the installation.

5. Protect the System to prevent damage from topical water for a minimum period of 24 hours from time of applications.

#### 1.10 WARRANTY

A. Provide manufacturer's written warranty for the System, covering system materials, testing, surface preparation, and installation. Additionally, warranty shall cover the cost of floor covering repair or replacement, as acceptable to Owner and Architect, including, but not limited to, removal work, surface preparation, underlayment, floor covering materials, primers, adhesives, and associated installation work.

1. Warranty Period: Ten years, minimum, or the life of finished floor covering, whichever comes first.

2. Replacement Cost: In the event of failure of the System during warranty period, manufacturer's warranty shall cover all costs for removal and replacement work including the System and floor covering, up to \$5,000,000 per occurrence.

B. Manufacturer's warranty exclusion shall be limited to the following:

1. System failure due to topical intrusion of water due to plumbing failure, or other substances entering from the surface.

2. Seismic damage occurring after installation.

3. Moisture emission in excess of the warranted limit of the System due to water intrusion, but not limited to plumbing or flooding leaks below the slab.
  4. Damage due to removal and demolition work necessitated by replacement of installed floor covering during warranty period.
- C. Warranty shall not exclude cracks visible at the time of installation or “improper System installation.”

## PART 2- PRODUCTS

### 2.1 MANUFACTURERS AND PRODUCTS

#### A. Vapor Emission Control System:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Vap I® 2000 by Koster American Corporation, Virginia Beach, VA; 757-425-1206, [www.koesterusa.com](http://www.koesterusa.com) or comparable product by one of the following:
  - a. Mapei; Planiseal VS.
  - b. Aquafin; Vaportight Coat-SG3.

- B. Substitutions: Under provisions of Section 01 33 00 and shall be acceptable to the Flooring and Adhesive Manufacturer.

### 2.2 SYSTEM DESCRIPTION

- A. System shall be a two component 100 percent solid epoxy that meets the following performance qualifications in a single coat application. System requiring more than one coat for installation is not acceptable.
- B. System Performance: Installed system shall provide pH levels within the range of 8-9, as determined by pH testing.
1. Perm Rating: ASTM E96-05 (Water Method); performance of the System shall be documented by an independent testing laboratory that the System does not exceed a net 0.1 perm rating.
  2. Relative Humidity Testing: ASTM F2170; System must perform in a 100% RH environment.
  3. Certified acceptance of exposure to continuous topical water exposure after final curing of the System.
  4. Vapor emission control system shall be applied in a single coat, and shall be a standalone system with no requirements for additional components, such as, sand broadcast for subsequent adhesion of floor covering.
- C. Accessories: Concrete repair materials, underlayment, and primers used under vapor emission control system shall be as recommended by or acceptable to the System manufacturer. Underlayment used over the System shall be acceptable to vapor emission control system and floor covering and adhesives manufacturers.

**2.3 MIXING**

- A. Use clean containers and mix components thoroughly, in accordance with manufacturer's printed instructions, to obtain a homogeneous mixture. Use a low speed motor less than 400 rpm and a two bladed Jiffy mixing blade only. Do not aerate the mixture. Mix ratios shall be measured by volume.

**PART 3- EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements and for other conditions affecting performance of the System.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
- C. Begin work after minimum concrete curing and drying period has passed, after unsatisfactory conditions have been corrected, and after surfaces are dry.

**3.2 CONCRETE SLAB TESTING**

- A. Testing Schedule: Testing shall be performed by an independent testing agency prior to and after application of the System. Contractor shall coordinate and schedule testing work with the Owner's testing agency. Provide testing surfaces as required by Owner's testing agency.
- B. Testing Environment:
  - 1. Environmental requirements for the area to be tested shall be as required for the finished floor covering (i.e. doors, windows, roofing, etc., shall be installed and the temperature of the building controlled to a finished building atmosphere).
  - 2. Tests are not to be executed when building interior is below 65 degrees F for 72 hours prior to and throughout the duration of the tests.
- C. Pre-Installation Testing: The testing agency shall perform pre-installation testing of concrete slab by pH, calcium chloride, and relative humidity tests prior to surface preparation for application of the System. Testing shall be performed by qualified testing personnel and testing agency. Results shall be submitted to Architect for evaluation. When tests results are above the allowable thresholds specified for the intended floor covering and adhesive materials, the contractor shall proceed with installation of the System.
  - 1. Concrete Testing: The testing agency shall perform testing for concrete deficiencies and contaminants, and to confirm that no curing compounds, sealers, coatings, un-reacted silicates, chlorides, and A.S.R. (alkali-silica reaction) are present.
  - 2. pH Testing: The testing agency shall perform three pH tests for the first 1,000 sq. ft. and one test for each 1,000 sq. ft. thereafter per the requirements of ASTM F710.
    - a. Resilient Flooring: pH shall be between 7 and 9.
    - b. Carpet: pH shall be between 5 and 9.
    - c. Crack Isolation Membrane: pH shall be between 7 and 9.
  - 3. Vapor Emission Testing: the testing agency shall perform calcium chloride tests per ASTM F1869. Perform three calcium chloride tests for the first 1,000 sq. ft. and one test for each 1,000 sq. ft. thereafter.
    - a. Resilient Flooring: Moisture emission rates shall not exceed 5.0 lbs./1000 sq. ft./24 hours.

- b. Carpet: Moisture emission rates shall not exceed 5.0 lbs./1000 sq. ft./24 hours.
    - c. Crack Isolation Membrane: Moisture emission rates shall not exceed 3.0 lbs./1000 sq ft./24 hours.
  4. Relative Humidity Testing: the testing agency shall perform tests for relative humidity in the concrete slab per ASTM F2170. Perform three tests for the first 1,000 sq. ft. and one test for each 1,000 sq. ft. thereafter.
    - a. Resilient Flooring: In slab relative humidity shall not exceed 80%.
    - b. Carpet: In slab relative humidity shall not exceed 80%.
    - c. Crack Isolation Membrane: In slab relative humidity shall not exceed 75%.
- D. Following mechanical preparation and any necessary leveling of the concrete surface, test the tensile strength of the concrete surface according to ASTM C1583. Tensile strength of the prepared substrate surface must be at least 200 psi tested in accordance with ASTM C1583. Areas of insufficient strength shall be ground to remove the weak material and abrasively prepared again using appropriately modified methods, and retested for tensile strength.
  1. Tensile Strength Testing: the testing agency shall perform tests for tensile strength of the concrete surface per ASTM C1583. Perform three tests for the first 1,000 sq. ft. and one test for each 1,000 sq. ft. thereafter.
- E. Mockup: Install the moisture mitigation system in a minimum 100 square foot mockup area, using the same methods and equipment used for the entire installation. The testing agency shall test tensile bond strength of the moisture mitigation system to the concrete substrate following ASTM D7234. The results must be equal to or greater than 200 psi.
- F. Post-Installation Testing (or if System is not required to be installed due to favorable test results): After the System application is complete and before installing floor covering, the testing agency shall observe the adhesion tests. Results shall be submitted to Architect for evaluation. If the adhesion test fails, the contractor shall resolve the condition prior to installation of floor covering at no additional cost to the owner.
  1. Environmental requirements for the area to be tested shall be as required for the finished floor covering (i.e. doors, windows, roofing, etc., shall be installed and the temperature of the building controlled to a finished building atmosphere).
  2. Tests are not to be executed when building interior is below 65 degrees F and above 85 degrees F for 72 hours prior to and throughout the duration of the tests.
  3. Adhesion Test (Bond Test): the testing agency shall verify the adhesion compatibility test performed by the flooring subcontractor for flooring adhesives, coatings, and leveling compounds over completed vapor emission control system, as acceptable to Architect, Floor and Adhesive Manufacturer, and Owner.
    - a. Once the subfloor preparation has been completed and is believed to be ready to receive the floor covering, the contractor shall select a small (minimum 3 foot by 3 foot) area to perform the bond test.
    - b. Cut out 6 strips of material (about 2 inches wide by 1 foot long). Using the specified adhesive, glue down each strip (side by side) using the recommended notched trowel, leaving 4 to 6 inches of space between each strip. Install strips of material following the same methods and procedures that are recommended herein for the installation of the specified product.
    - c. After a period of at least 24 hours (verify cure time of adhesive used), attempt to remove the flooring by pulling up one of the corners of the sample. If the bond is adequate, the material will most likely rip apart before it lets go of the substrate.

d. If bond is adequate, proceed with installation of the flooring.

G. The testing agency shall document and submit all pH, calcium chloride, relative humidity, and adhesion test results to the Architect, Contractor, and Owner.

### 3.3 PREPARATION

- A. Prior to installation of compliance system all walls and previously installed floor coverings shall be masked or otherwise protected from the effects of scarification and system application.
- B. Clean and prepare substrates according to the System manufacturer's written recommendations to produce clean, dust-free, dry substrate for the System application.
- C. Remove silicate based floor hardeners or curing compounds from concrete slabs as recommended by the System manufacturer.
- D. Remove defective materials, and foreign matter, such as, dust, adhesives (do not use solvents to remove adhesives), paint, dirt, floor hardeners, bond breakers, oil, grease, curing agents, wax, form release agents, efflorescence, and laitance.
- E. Cracks, control joints, and cold joints shall be prepared and treated in accordance with the System manufacturer's requirements.
- F. Clean and fill chips, voids and other surface irregularities with repair materials as recommended by the System manufacturer.
- G. Acid etching is not permitted.
- H. Shot blast or mechanically prepare the concrete surface to an ICRI Concrete Surface Profile (CSP) of 3 to ensure bonding of the System to concrete. Grinding is permitted only in areas inaccessible to shot blasting or for edging purposes. Shot blast a small test area and review surface profile with the finished flooring applicator. The System is not a leveling material therefore a feather finish or leveling material may be required to flatten or level the System treated concrete prior to the flooring installation. Consult with Flooring and Adhesive Manufacturers. Installation of leveling material shall be done at no additional cost to the owner.
- I. Upon completion of the shot blasting and grinding, the concrete slab must be vacuumed free of all dust, dirt, and debris and allowed to dry undisturbed for 16 to 24 hours prior to the installation of the System. Do not use sweeping compounds that may contain oil.
- J. System to receive resilient flooring shall conform to applicable requirements of ASTM F710.
- K. Before application of the System, prepared surfaces shall be inspected by and acceptable to the System manufacturer's technical representative.

### 3.4 INSTALLATION

- A. General: Install vapor emission control system in accordance with manufacturer's written instructions as reviewed by Architect during the submittal process.
- B. Application Temperature Limits: Install the System within the following temperature limitations:
  - 1. Above 65 degrees F and below 85 degrees F; with relative humidity between 40 and 60%.
- C. Installation Requirements and Procedures:
  - 1. Application: Unless otherwise required by the System manufacturer, apply one coat of vapor emission control system at an average coverage rate of 75-150 sq. ft./gallon using a squeegee



and or 3/8-inch nap roller leaving no areas untreated. Allow the System to cure for a minimum of 12 hours before installing floor covering.

a. Coverage rates shall be in accordance with the System manufacturer's recommendations and based on concrete density and porosity.

2. Environmental Condition: Install the System in environmental conditions that are representative of the environmental operating conditions of finished project.

D. Provide a leveling underlayment in conjunction with a primer when required by the Flooring Manufacturer to smooth and/or level surfaces after shot blasting and installation of the System.

E. When water based adhesives are used in the floor covering installation, use an approved underlayment system with primer, prior to the installation of the flooring system. Consult the adhesive manufacturer for their minimum recommended thickness of cementitious underlayment to absorb excess moisture in the adhesive.

### 3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Pre-installation testing, the System installation, and Post-installation testing shall be conducted in the presence of manufacturer's representative.

### 3.6 CLEANING

A. Clean all tools and equipment with Xylene (or similar material approved by the System manufacturer) immediately after use of the System.

B. Remove all debris resulting from the System installation from Project site.

### 3.7 PROTECTION

A. Protect installed vapor emission control system during curing period and until installation of the resilient floor covering from traffic, topical water, dirt, dust, and other surface contaminants.

**END OF SECTION 07 26 50**

**SECTION 07 54 20 – MODIFIED KEE MEMBRANE ROOFING**

**1. GENERAL**

**1.1. SECTION INCLUDES**

- A. Includes all labor, materials, and equipment to install a Cold Applied 2-Ply Thermoplastic Hybrid Roof System roof (KEE-Stone FB 60) over the properly prepared substrate.
- B. Extent of cold applied 2-ply thermoplastic system is indicated on the drawings and by provisions of this section, and is defined to include roofing, composite insulating roof deck system (LWIC) immediately under the roofing, composition flashing and stripping, and roofing accessories integrally related to roof installation.

**1.2. RELATED SECTIONS**

- A. Section 01 11 00 – Summary of Work
- B. Section 03 52 16 – Lightweight Insulating Concrete
- C. Section 06 10 00 - Rough Carpentry
- D. Section 07 62 00 - Sheet Metal Flashing and Trim
- E. Section 07 72 00 – Roof Accessories

**1.3. REFERENCES**

- A. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Damp-proofing, and Waterproofing.
- B. ASTM D 312 - Standard Specification for Asphalt used in Roofing.
- C. ASTM D 451 - Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
- D. ASTM D 1970 - Specification for Sheet Materials, Self-Adhering Polymer Modified Bituminous, Used as Steep Roofing Underlayment for Ice Dam Protection.
- E. ASTM D 1079 Standard Terminology Relating to Roofing, Waterproofing and Bituminous Materials.
- F. ASTM D 1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
- G. ASTM D 1863 Standard Specification for Mineral Aggregate Used as a Protective Coating for Roofing.
- H. ASTM D 2178 Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
- I. ASTM D 2822 Standard Specification for Asphalt Roof Cement.
- J. ASTM D 2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.
- K. ASTM D 4601 Standard Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.
- L. ASTM D 5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
- M. ASTM D 6754 Standard Specification for Ketone Ethylene Ester (KEE) Sheet Roofing
- N. ASTM D 6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
- O. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified

- Bituminous Sheet Materials Using Glass Fiber Reinforcements.
- P. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
- Q. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings
- R. Factory Mutual Research (FM): Roof Assembly Classifications.
- S. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
- T. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.
- U. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.
- V. Warnock Hersey (WH): Fire Hazard Classifications.
- W. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.
- X. ASCE 7, Minimum Design Loads for Buildings and Other Structures
- Y. UL - Fire Resistance Directory.
- Z. FM Approvals - Roof Coverings and/or RoofNav assembly database.
- AA. California Title 24 Energy Efficient Standards.

**1.4. DESIGN / PERFORMANCE REQUIREMENTS**

- A. Perform work in accordance with all federal, state, and local codes.
- B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class rating for roof slopes indicated on the Drawings as follows:
  - 1. Factory Mutual Class A Rating.
  - 2. Underwriters Laboratory Class A Rating.
  - 3. Warnock Hersey Class A Rating.
- C. Design Requirements:
  - 1. Uniform Wind Uplift Load Capacity
    - a. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
      - 1. Design Code: ASCE 7, Method 2 for Components and Cladding.
      - 2. Risk Category:
        - a. II.
      - 3. Importance Factor of:
        - a. 1.0
      - 4. Wind Speed: 95 mph
      - 5. Exposure Category:
        - a. C
      - 6. Design Roof Height: 40 feet.
      - 7. Minimum Building Width: 70 feet.
      - 8. Roof Pitch: 0.25 :12.

9. Wind Uplift Loads (zones defined per ASCE 7-16 fig. 30.3-2 through 30.3-6):
  - a. Zone 1 (roof area field): 12 psf
  - b. Zone 2 (roof area perimeter): 34 psf
  - c. Zone 3 (roof area corners): 50 psf
  - d. Discontinuity Distance:  $a = 7.2$  ft.
2. Snow Load: N/A psf.
3. Live Load: 20 psf, or not to exceed original building design.
4. Dead Load:
  - a. Installation of new roofing materials shall not exceed the dead load capacity of the roof structure.
- D. Roof System membranes containing recycled or bio-based materials shall be third party certified through UL Environment.
- E. Roof system shall have been tested in compliance with the following codes and test requirements:
  1. Cool Roof Rating Council:
    - a. CRRC Directory CRRC 077-0028
  2. FM Approvals.
  3. International Code Council Evaluation Service (ICC-ES):
    - a. Membrane Systems
      1. ESR-3460
  4. Underwriters Laboratories
  5. Warnock Hersey.

#### 1.5. SUBMITTALS

- A. Submit under provisions of General Conditions, Article 3, Parts 3.7 and 3.9.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation instructions.
- C. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, coverboard, and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.
- D. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins. Report shall be reviewed by a Professional Engineer registered in the State of the Project who has provided roof system attachment analysis for not less than 5 consecutive years.
- E. Recycled or Bio-Based Materials: Provide third party certification through UL Environment of roof System membranes containing recycled or bio based materials
- F. Verification Samples: For each membrane ply product specified, two samples, minimum size

6 inches (150 mm) square, representing actual product, color, and patterns.

- G. Provide written certification from the roofing system manufacturer certifying the applicator is currently authorized to install the specified roof system and ability to provide the specified warranty.
- H. Sample Warranty: Provide an unexecuted copy of the warranty specified for this project clearly stating the terms required of the owner, contractor, and manufacturer.
- I. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.
- J. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147.
- K. Manufacturer's Fire Compliance Certificate: Certify that the roof system furnished is approved by Factory Mutual (FM), Underwriters Laboratories (UL), Warnock Hersey (WH) or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.
- L. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

#### 1.6. QUALITY ASSURANCE

- A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.
- C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.
- D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.
- E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

#### 1.7. PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to commencing Work of this section.
- B. Review installation procedures and coordination required with related Work.
- C. Inspect and make notes of job conditions prior to installation:
  - 1. Record minutes of the conference and provide copies to all parties present.
  - 2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.

3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Owner and Architect.

#### 1.8. DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.
- C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.
- D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50-degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.
- E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.
- F. Adhesive storage shall be between the range of above 50-degree F (10 degree C) and below 80-degree F (27 degree C). Area of storage shall be constructed for flammable storage.

#### 1.9. COORDINATION

- A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

#### 1.10. PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

#### 1.11. WARRANTY

- A. Upon completion of the work, provide the Manufacturer's written and signed NDL Warranty, warranting that, if a leak develops in the roof during the term of this warranty, due either to defective material or defective workmanship by the installing contractor, the manufacturer shall provide the Owner, at the Manufacturer's expense, with the labor and material necessary to return the defective area to a watertight condition.
  1. Warranty Period:
    - a. 30 years from date of acceptance.
- B. Installer is to guarantee all work against defects in materials and workmanship for a period indicated following final acceptance of the Work.
  1. Warranty Period:
    - a. 3 years from date of acceptance.

## 2. PRODUCTS

### 2.1. MANUFACTURERS

- A. Acceptable Manufacturer: The Garland Company, Inc.; 3800 E. 91st St., Cleveland, OH 44105. Local Representative: Richard Jones Phone: (559) 647-1196.  
[rjones@garlandco.com](mailto:rjones@garlandco.com) Web Site: [www.garlandco.com](http://www.garlandco.com).
- B. The Products specified are intended and the Standard of Quality for the products required

for this project. If other products are proposed, the bidder must obtain approval from the Architect and Owner per the procedures identified in the contract documents and per the following requirements.

1. Changes to the materials after the bid opening date will require approval by the Architect and Owner.
2. If alternate products are included in the bid, the products must be equal to or exceed the products specified. Supporting technical data shall be submitted to the Architect/ Owner for approval prior to acceptance.
3. In making a request for substitution, the Contractor represents that it has:
  - a. Personally, investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.
  - b. Will provide the same guarantee for substitution as for the product and method specified.
  - c. Will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
  - d. Will waive all claims for additional cost related to substitution, which consequently become apparent.
  - e. Cost data is complete and includes all related cost under their contract or other contracts, which may be affected by the substitution.
  - f. Will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitution.
4. Architect/ Owner reserves the right to be the final authority on the acceptance or rejection of any substitution, proposed alternate roofing systems, or materials that has met ALL specified requirement criteria.
5. Failure to submit substitution package, or any portion thereof requested, will result in immediate rejection and consideration for the request for manufacturer substitution.

## **2.2. COLD APPLIED 2-PLY ROOF SYSTEM**

- A. Base Sheet: One ply of mechanically attached to the prepared substrate.
  1. HPR Premium Glasbase:
- B. Insulation/Coverboard:
  1. One layer of six side primed ½” woodfiber insulation board
- C. Base (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive (1):
  1. Flexbase 80 Base Sheet (80 mil):
- D. Interply Adhesive (1):
  1. Green Lock Plus Membrane Adhesive:
- E. Thermoplastic Sheet: One ply bonded to the prepared substrate with Interply Adhesive (2):
  1. KEE Stone FB 60:
- F. Interply Adhesive (2):
  1. KEE-Lock Spatter Spray:
- G. Base & Wall Flashing (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive (3).
- H. Flashing Membrane Adhesive: Adhesive (3)

1. Green Lock Plus Flashing Adhesive
- I. Flashing Membrane Sheet: One ply bonded to the prepared substrate with Adhesive (4):
  1. KEE-Stone NF 60:
- J. Flashing Membrane Adhesive: Adhesive (4)
  1. KEE-Lock WB Flashing Adhesive

### 2.3. ACCESSORIES:

- A. Roof Insulation Field Layer: Provide and install one layer of ½" six side primed Blue Ridge Structodek High Density Fiberboard Roof Insulation. ASTM C 208, Type II.
- B. Vapor Retarder: Red Rosin Paper; Install layer rosin sheet shingled uniformly to achieve one ply over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof.
  1. Red Rosin Paper by WR Meadows
    - a. Weight – 12 lb./roll
    - b. Size – 500 square feet p/roll
    - c. 36" wide by 167' long
- C. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless-steel nails shall be used with aluminum; and stainless-steel nails shall be used with stainless steel, Fasteners shall be self-clinching type of penetrating type as recommended by the deck manufacturer. Fasten nails and fasteners flush-driven through flat metal discs not less than 1 inch (25 mm) diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than 1 inch (25 mm) diameter are used.
- D. Base Sheet Fasteners for LWIC: CR-10 factory-coated G-90 galvanized steel fasteners, 1 ¾" long, with 2 ¾" diameter galvalume plates designed for fastening built-up roofing base sheets to LWIC substrate, tested by manufacturer for required pullout strength, and acceptable to roofing manufacturer.
  1. Basis of Design Product: Subject to compliance with requirements, provide OMG Roofing Products (Olympic); CR(1.75) BSF (Miami-Dade NOA# 11-0301.06) or comparable product by one of the following:
    - a. ES Products, LLC; FM-90 Fasteners. (Miami-Dade NOA# 12-0619.08)
    - b. Architect and District approved equal with Miami-Dade report and AHJ approval.
- E. Moisture/Vapor Vent.
  1. Basis of Design Product: Subject to compliance with requirements, provide **Johns Manville; FP-10 One Way Roof Vent** or comparable product by one of the following:
    - a. Architect and District approved equal with acceptance by Roofing Manufacturer.
- F. Walkway Pads - As recommended and furnished by the membrane manufacturer adhered to control foot traffic on roof top surface and provide a durable system compliant non-slip walkway.
  1. KEE Walkway Roll by Viking Products Group
    - a. 30" x 60' walk way roll
    - b. Install walk way pads in a path from all roof access points to and around all



HVAC and serviceable mechanical equipment, to and around roof hatches, and as designated by the owner.

- G. Urethane Sealant Hybrid - Tuff-Stuff MS: One part, non-sag sealant as approved and furnished by the membrane manufacturer for moving joints.
  - 1. Tensile Strength, ASTM D 412: 250 psi
  - 2. Elongation, ASTM D 412: 450%
  - 3. Hardness, Shore A ASTM C 920: 35
  - 4. Adhesion-in-Peel, ASTM C 92: 30 pli
- H. Sealant - Green-Lock Structural Adhesive: Single component, 100% solids structural adhesive as furnished and recommended by the membrane manufacturer.
  - 1. Elongation, ASTM D 412: 300%
  - 2. Hardness, Shore A, ASTM C 920: 50
  - 3. Shear Strength, ASTM D 1002: 300 psi
- I. Butyl Tape: 100% solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.
- J. Glass Fiber Cant - Glass Cant: Continuous triangular cross Section made of inorganic fibrous glass used as a cant strip as recommended and furnished by the membrane manufacturer.

#### 2.4. EDGE TREATMENT AND ROOF PENETRATION FLASHINGS

- A. Pre-Manufactured Edge Metal Finishes:
  - 1. Exposed and unexposed surfaces for mill finish flashing, fascia, and coping cap, as shipped from the mill
  - 2. Exposed surfaces for coated panels:
    - a. Steel Finishes: fluorocarbon finish. Epoxy primer baked both sides, .2-.25 mils thickness as approved by finish coat manufacturer. Weathering finish as referred by National Coil Coaters Association (NCCA). Provided with the following properties.
      - 1. Pencil Hardness: ASTM D3363, HB-H / NCCA II-2.
      - 2. Bend: ASTM D-4145, O-T / NCCA II-19
      - 3. Cross-Hatch Adhesion: ASTM D3359, no loss of adhesion
      - 4. Gloss (60 deg. angle): ASTM D523, 25+/-5%
      - 5. Reverse Bend: ASTM D2794, no cracking or loss of adhesion
      - 6. Nominal Thickness: ASTM D1005
        - a. Primer: 0.2 mils
        - b. Topcoat, 0.7 mils min
        - c. Clear Coat (optional, only used with 22 ga. steel) 0.3 mils
      - 7. Color: Provide as specified. (Subject to minimum quantities)
- B. Flashing Boot - SolarBright Flashing Boot: KEE pipe boot for sealing single or multiple pipe penetrations adhered in approved adhesives as recommended and furnished by the membrane manufacturer.
- C. Vents and Breathers: Heavy gauge aluminum and fully insulated vent that allows moisture

and air to escape but not enter the roof system as recommended and furnished by the membrane manufacturer.

- D. Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight. See details for design.
- E. Drain Flashings should be 4lb (1.8kg) sheet lead formed and rolled.
- F. Plumbing stacks are too have KEE Membrane Flashing Boots. Caulking and banding will be required with the specified sealant.
- G. Liquid Flashing - Tuff-Flash: An asphaltic-polyurethane, low odor, liquid flashing material designed for specialized details unable to be waterproofed with typical modified membrane flashings.
  - 1. Tensile Strength, ASTM D 412: 400 psi
  - 2. Elongation, ASTM D 412: 300%
  - 3. Density @77 deg. F 8.5 lb/gal typical
- H. Fabricated Flashings: Fabricated flashings and trim are specified in Section 07 62 00.
  - 1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.
- I. Manufactured Roof Specialties: Shop fabricated copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are specified in Section 07.
  - 1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing Manual" as applicable.

### **3. EXECUTION**

#### **3.1. EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.
- C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.
- D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### **3.2. PREPARATION**

- A. General: Clean surfaces thoroughly prior to installation.
  - 1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
  - 2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
  - 3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
  - 4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
  - 5. Do not apply roofing during inclement weather. Do not apply roofing membrane to

damp, frozen, dirty, or dusty surfaces.

6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

### 3.3. INSTALLATION - GENERAL

- A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.
- B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:
  1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
  2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.
- C. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water
- D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

### 3.4. INSTALLATION COLD APPLIED ROOF SYSTEM

- A. Base Ply: Cut base ply sheets into 18-foot lengths and allow plies to relax before installing. Install base sheet in Interply Adhesive: applied at the rate required by the manufacturer. Shingle base sheets uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.
  1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
  2. Solidly bond to the substrate and adjacent ply with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
  3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Use care to eliminate air entrapment under the membrane.
  4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
  5. Extend plies 2 inches beyond top edges of cants at wall and projection bases.

6. Install base flashing ply to all perimeter and projection details.
  7. Allow the one ply of base sheet to cure at least 30 minutes before installing the KEE membrane.
  8. Thermoplastic Cap Ply: Allow the membrane to relax before installing. Install in interply adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of plies specified. Shingle in proper direction to shed water on each large area of roofing.
  9. All field seams exceeding 10 feet in length shall be welded with an approved automatic welder.
  10. All field seams must be clean and dry prior to initiating any field welding. Remove foreign materials from the seams (dirt, oils, etc.) with acetone or authorized alternative. Use CLEAN WHITE COTTON cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder. Do not use denim or synthetic rags for cleaning.
  11. Contaminated areas within a membrane seam will inhibit proper welding and will require a membrane patch or strip.
  12. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld. The lap or seam area of the membrane may be intermittently tack welded to hold the membrane in place.
  13. The back interior edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.
  14. Follow local code requirements for electric supply, grounding, and surge protection. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.
  15. Properly welded seams shall utilize a 1.5-inch-wide nozzle, to create a homogeneous weld, a minimum of 1.5 inches in width.
- B. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.
- C. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers, and cant strips as specified in Section 06 10 00.
1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
  2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.
  3. Nailer lengths should be spaced with a minimum 1/8-inch gap for expansion and contraction between each length or change of direction.
  4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.
- D. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings as specified in Section 07 62 00. Install in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.
- E. Termination Bar: Provide a metal termination bar or approved top edge securement at the

terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o/c to achieve constant compression. Provide suitable, sealant at the top edge if required.

- F. Flashing Base Ply: Install flashing sheets by the same application method used for the base ply.
1. Seal curb, wall, and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
  2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
  3. Adhere to the underlying base ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
  4. Solidly adhere the entire flashing ply to the substrate. Secure the tops of all flashings that are not run up and over curb through termination bar fastened at 6 inches (152 mm) O.C. and sealed at top.
  5. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
  6. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.
  7. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.
- G. Flashing Cap Ply:
1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
  2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
  3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
  4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
  5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.
  6. All stripping shall be installed prior to flashing cap sheet installation.
  7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.
  8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.
- H. Roof Walkways: Provide walkways in areas indicated on the Drawings or at a minimum;
- a. Install walk way pads in a path from all roof access points to and around all

HVAC and serviceable mechanical equipment, to and around roof hatches, and as designated by the owner.

### 3.5. INSTALLATION EDGE TREATMENT AND ROOF PENETRATION FLASHING

- A. Fabricated Flashings: Fabricated flashings and trim are provided as specified in Section 07 62 00.
  - 1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the Copper Development Association "Copper in Architecture - Handbook" as applicable.
- B. Metal Edge:
  - 1. Inspect the nailers to assure proper attachment and configuration.
  - 2. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.
  - 3. Install continuous cleat and fasten at 6 inches (152 mm) o.c.
  - 4. Install new Clad Metal edge hooked to continuous cleat. Fasten flange to wood nailers every 3 inches (76 mm) o.c. staggered.
  - 5. Strip in flange with KEE Stripping Membrane with 6 inches (152 mm) on to the field of roof. Assure ply laps do not coincide with metal laps.
- C. Roof Edge With Gutter:
  - 1. Inspect the nailer to assure proper attachment and configuration. Increase slope at metal edge by additional degree of slope in first board.
  - 2. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.
  - 3. Install gutter and strapping.
  - 4. Install continuous cleat and fasten at 6 inches (152 mm) o.c.
  - 5. Install new Clad Metal metal edge hooked to continuous cleat and Fasten flange to wood nailer every 3 inches (76 mm) o.c. staggered.
  - 6. Strip in flange with KEE Membrane Stripping ply covering entire flange. Assure ply laps do not coincide with metal laps.
- D. Scupper Through Wall (Overflow):
  - 1. Inspect the nailer to assure proper attachment and configuration.
  - 2. Run one ply over nailer up the overflow, into the scupper hole and up flashing as in typical wall flashing detail. Assure coverage of all wood nailers.
  - 3. Install scupper box in a 1/4-inch (6 mm) bed of mastic. Assure all box seams are soldered and have a minimum 4-inch (101 mm) flange. Make sure all corners are closed and soldered.
  - 4. Fasten flange of scupper box every 3 inches (76 mm) o.c. staggered.
  - 5. Strip in flange scupper box with KEE Stripping ply covering entire area with 6 inch (152 mm) overlap on to the field of the roof and wall flashing.
- E. Coping Cap:
  - 1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm).
  - 2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).

3. Attach tapered board to top of wall.
  4. Install base flashing ply covering entire wall and wrapped over top of wall and down face with 6 inches (152 mm) on to field of roof and set in cold adhesive. Nail membrane at 8 inches (203 mm) o.c.
  5. Install continuous cleat and fasten at 6 inches (152 mm) o.c. to outside wall.
  6. Install new metal coping cap hooked to continuous cleat.
  7. Fasten inside cap 24 inches (609 mm) o.c. with approved fasteners and neoprene washers through slotted holes, which allow for expansion and contraction.
- F. Surface Mounted Counterflashing:
1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm). Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
  2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
  3. Install base flashing ply covering wall set in bitumen with 6 inches (152 mm) on to field of the roof.
  4. Install KEE Membrane ply in adhesive over the base flashing ply, 9 inches (228 mm) on to the field of the roof.
  5. Apply butyl tape to wall behind flashing. Secure termination bar through flashing, butyl tape and into wall. Alternatively use caulk to replace the butyl tape.
  6. Secure counterflashing set on butyl tape above flashing at 8 inches (203 mm) o.c. and caulk top of counterflashing.
- G. Curb Detail/Air Handling Station:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
  2. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
  3. Install a KEE Membrane ply in adhesive over the base flashing ply, 9 inches (228 mm) on to the field of the roof.
  4. Install pre-manufactured counterflashing with fasteners and neoprene washers or per manufacturer's recommendations.
  5. Set equipment on neoprene pad and fasten as required by equipment manufacturer.
- H. Roof Drain:
1. Plug drain to prevent debris from entering plumbing.
  2. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.
  3. Install base flashing ply (40-inch square minimum) in bitumen.
  4. Set lead/copper flashing (30-inch square minimum) in 1/4-inch (6 mm) bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime lead/copper at a rate of 100 square feet per gallon and allow to dry.
  5. Run roof system plies over drain. Cut out plies inside drain bowl.
  6. Install modified membrane (48-inch square minimum) in bitumen.
  7. Install clamping ring and assure that all plies are under the clamping ring.
  8. Remove drain plug and install strainer.

- I. Plumbing Stack:
  - 1. Minimum stack height is 12 inches (609 mm).
  - 2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
  - 3. Set lead/copper flashing in 1/4-inch (6 mm) bed of mastic.
  - 4. Caulk the intersection of the membrane with elastomeric sealant.
  - 5. Install KEE Membrane Boot, clamp and seal the top with urethane sealant.
- J. Heat Stack:
  - 1. Minimum stack height is 12 inches (609 mm).
  - 2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
  - 3. Prime flange of new sleeve. Install properly sized sleeves set in 1/4-inch (6 mm) bed of roof cement.
  - 4. Install base flashing ply in bitumen.
  - 5. Install modified membrane in bitumen.
  - 6. Caulk the intersection of the membrane with elastomeric sealant.
  - 7. Install new collar over cape. Weld collar or install stainless steel draw brand.

### 3.6. CLEANING

- A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles, and other debris resulting from these operations.
- B. Remove asphalt markings from finished surfaces.
- C. Repair or replace defaced or disfigured finishes caused by Work of this section.

### 3.7. PROTECTION

- A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes, and the like to protect personnel, roofs and structures, vehicles, and utilities.
- B. Protect exposed surfaces of finished walls with tarps to prevent damage.
- C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.
- D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.
- E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

### 3.8. FIELD QUALITY CONTROL

- A. Inspection: Provide manufacturer's field observations at start-up and two (2) days per week through project completion. Provide a final inspection upon completion of the Work.
  - 1. Warranty shall be issued upon manufacturer's acceptance of the installation.
  - 2. Field observations shall be performed by a representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
  - 3. Provide observation reports from the representative indicating procedures followed, weather conditions and any discrepancies found during inspection.



4. Provide a final report from the representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

### 3.9. SCHEDULES

#### A. Base Sheet:

1. HPR Premium Glasbase: 55 mil asphalt coated base sheet.
  - a. Tensile Strength, ASTM D 4601
    1. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 100 lbf/in XD 80 lbf/in
    2. 50mm/min. @ 23 +/- 2 deg. C MD 8.75 kN/m XD 8.75 kN/m

#### B. Base (Ply) Sheet:

1. Flexbase 80 Base Sheet (80 mil): 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing membrane reinforced with a fiberglass scrim, performance requirements according to ASTM D 6163.
  - a. Tensile Strength, ASTM D 5147
    1. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 225 lbf/in XD 225 lbf/in
    2. 50mm/min. @ 23 +/- 2 deg. C MD 8.75 kN/m XD 8.75 kN/m
  - b. Tear Strength, ASTM D 5147
    1. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf XD 300 lbf
    2. 50mm/min. @ 23 +/- 2 deg. C MD 444.8 N XD 444.8 N
  - c. Elongation at Maximum Tensile, ASTM D 5147
    1. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 7.0 % XD 7.0 %
    2. 50mm/min @ 23 +/- 2 deg. C MD 7.0 % XD 7.0 %
  - d. Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-28.8 deg. C)

#### C. Thermoplastic/Modified Cap (Ply) Sheet:

1. KEE-Stone FB 60: 60 mil thermoplastic, ketone ethylene ester (KEE) roofing membrane with polyester scrim. ASTM D6754
  - a. Breaking Strength, ASTM D 751, Proc. B, strip
    1. 375 lbf. (1,668 N)
  - b. Tear Strength ASTM D 751
    1. 120 lbf. min. (534 N)
  - c. Elongation at Break (%), ASTM D 751, Proc. B, Strip
    1. 40.0%

#### D. Interply Adhesive (1 & 2):

1. Green-Lock Plus Membrane Adhesive: Cold applied solvent free membrane adhesive: zero V.O.C. compliant performance requirements:
  - a. Non-Volatile Content ASTM D 4586 100%
  - b. Density ASTM D 1475 11.4 lbs./gal. (1.36 g/m<sup>3</sup>)
  - c. Viscosity Brookfield 20,000-50,000 cPs.
  - d. Flash Point ASTM D 93 400 deg. F min. (232 deg. C)

- e. Slope: up to 3:12
- 2. KEE-Lock Spatter Spray: Dual component, single bead (spatter applied) urethane insulation/membrane adhesive.
  - a. Tensile Strength (ASTM D 412) 250 psi
  - b. Density (ASTM D 1875) 8.5 lbs./gal.
  - c. Viscosity (ASTM D 2556) 22,000 - 60,000 cP
  - d. Peel Strength (ASTM D 903) 17 lb./in.
  - e. Flexibility (ASTM D 816) Pass @ -70 deg. F (-56.7 deg. C)
- E. Flashing Ply Adhesive:
  - 1. KEE-Lock WB Bonding Adhesive: Contact bonding adhesive specifically designed for bonding KEE membranes and flashings to vertical substrates.
    - a. Coverage: 1 - 1.5 gal per sq both sides
    - b. Color: Blue
    - c. VOC: 0 g/l
- F. Surfacing:
  - 1. Flashing Membrane Sheet:
  - 2. KEE-Stone NF 60 Flashing
    - 1. Breaking Strength: 375
    - 2. Tear Strength: 145 x 200
    - 3. Color: White
    - 4. Thickness: 60 mil

**END OF SECTION 07 55 00**

**SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manufactured Products:

- a. Manufactured reglets and counterflashing.

2. Formed Products:

- a. Formed roof drainage sheet metal fabrications.  
b. Formed low-slope roof sheet metal fabrications.  
c. Formed wall sheet metal fabrications.  
d. Formed equipment support flashing.

B. Related Sections:

1. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking.  
2. Section 07 46 00 "EIFS Panel System" for sheet metal flashing.  
3. Section 07 72 00 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

- B. Fabricate and install copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:

1. Wind Zone Class 1-90: For velocity pressures of 31 to 45 lbf/sq. ft.: 90-lbf/sq. ft. perimeter uplift force, 120-lbf/sq. ft. corner uplift force, and 45-lbf/sq. ft. outward force.

- C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
  - 1. Identification of material, thickness, weight, and finish for each item and location in Project.
  - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
  - 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  - 4. Details of termination points and assemblies, including fixed points.
  - 5. Details of special conditions.
  - 6. Details of connections to adjoining work.
  - 7. Layout drawings at a scale of not less than 1/4 inches per 12 inches.
  - 8. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches.
- C. Qualification Data: For qualified fabricator.

#### 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- C. Preinstallation Conference: Conduct conference in conjunction with Preinstallation Roofing Conference at Project site.
  - 1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
  - 2. Review methods and procedures related to sheet metal flashing and trim.
  - 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
  - 4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
  - 5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

**PART 2 - PRODUCTS**

**2.1 SHEET METALS**

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755.
  - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation; structural quality.
  - 2. Surface: Smooth, flat and mill phosphatized for field painting

**2.2 UNDERLAYMENT MATERIALS**

- A. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.
- B. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- C. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

**2.3 MISCELLANEOUS MATERIALS**

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
  - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
  - 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153 or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:
  - 1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

#### 2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions with interlocking counterflashing on exterior face, of same metal as reglet.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide products by Fry Reglet Corporation or comparable product by one of the following:
    - a. Cheney Flashing Company.
    - b. Heckmann Building Products Inc.
    - c. Hickman, W. P. Company.
    - d. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
    - e. Keystone Flashing Company, Inc.
    - f. National Sheet Metal Systems, Inc.
    - g. Sandell Manufacturing Company, Inc.
  - 2. Material: Galvanized steel, 0.028 inch (24 gauge) thick.
  - 3. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
  - 4. Accessories:
    - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
    - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
  - 5. Finish: Mill phosphatized for field painting.

#### 2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
  - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  - 2. Obtain field measurements for accurate fit before shop fabrication.
  - 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- H. Do not use graphite pencils to mark metal surfaces.

## 2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight.
  1. Coping Profile: As indicated on drawings.
  2. Joint Style: Flat lock seam.
  3. Fabricate from the following materials:
    - a. Galvanized Steel: 0.028 inch (24 gauge) thick.
- B. Base Flashing: Fabricate from the following materials:
  1. Galvanized Steel: 0.028 inch (24 gauge) thick.
- C. Counterflashing: Fabricate from the following materials:
  1. Galvanized Steel: 0.028 inch (24 gauge) thick.
- D. Flashing Receivers: Fabricate from the following materials:
  1. Galvanized Steel: 0.028 inch (24 gauge) thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
  1. Galvanized Steel: 0.028 inch (24 gauge) thick.

**2.7 WALL SHEET METAL FABRICATIONS**

- A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
  - 1. Galvanized Steel: 0.028 inch (24 gauge) thick.

**2.8 MISCELLANEOUS SHEET METAL FABRICATIONS**

- A. Equipment Support Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.028 inch (24 gauge) thick.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
  - 1. Verify compliance with requirements for installation tolerances of substrates.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 UNDERLAYMENT INSTALLATION**

- A. General: Install underlayment as indicated on Drawings.
- B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

**3.3 INSTALLATION, GENERAL**

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 3. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
  - 4. Install sealant tape where indicated.
  - 5. Torch cutting of sheet metal flashing and trim is not permitted.
  - 6. Do not use graphite pencils to mark metal surfaces.



- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
  - 1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 3/4 inch for wood screws and metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as shown and as required for watertight construction.
  - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
  - 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
  - 1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

### 3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone class and as indicated.
  - 1. Interlock bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend

counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of anchor and washer at 36-inch centers.

- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

### 3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches] beyond wall openings.

### 3.6 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

### 3.7 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

### 3.8 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION 07 62 00**

**SECTION 07 72 00 - ROOF ACCESSORIES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Equipment supports.
- 2. Pipe and conduit supports
- 3. Roof hatches.

B. Related Sections:

- 1. Section 05 50 00 "Metal Fabrications" for metal vertical ladders for access to roof hatches.
- 2. Section 07 55 00 "Modified Kee Membrane Roofing."
- 3. Section 07 62 00 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, and miscellaneous sheet metal trim and accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.4 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
  - 1. Size and location of roof accessories specified in this Section.
  - 2. Method of attaching roof accessories to roof or building structure.
  - 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
  - 4. Required clearances.
- D. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.5 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation and mill phosphatized for field painting where indicated.
  - 1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
- B. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.
- C. Steel Shapes: ASTM A 36, hot-dip galvanized according to ASTM A 123 unless otherwise indicated.
- D. Steel Tube: ASTM A 500, round tube.
- E. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123.
- F. Steel Pipe: ASTM A 53, galvanized.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, thickness as indicated.
- C. Glass-Fiber Board Insulation: ASTM C 726, thickness as indicated.
- D. Polyisocyanurate Board Insulation: ASTM C 1289, thickness as indicated.
- E. Wood Nailers:
  - 1. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick. ]
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Underlayment:
  - 1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- H. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened.

Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
- I. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- J. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- K. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- L. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

### 2.3 EQUIPMENT SUPPORTS

- A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints and integrally formed deck-mounting flange at perimeter bottom.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. AES Industries, Inc.
    - b. Curbs Plus, Inc.
    - c. Custom Solution Roof and Metal Products.
    - d. Greenheck Fan Corporation.
    - e. LM Curbs.
    - f. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    - g. Pate Company (The).
    - h. Roof Products, Inc.
    - i. Vent Products Co., Inc.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Zinc-coated (galvanized) steel sheet, 0.079 inch (14 gauge) thick.
  1. Finish: Mill phosphatized.
- D. Construction:
  1. Factory-installed continuous wood nailers as indicated on drawings at tops of equipment supports.
  2. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
  3. Fabricate equipment supports to minimum height of 24 inches (8 inches minimum above roofing surface).

4. Sloping Roofs: Where roof slope, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.

#### 2.4 PIPE AND CONDUIT SUPPORTS

- A. Pipe and Conduit Supports: Units comprised of rubber curb base and metal channel strut to support pipes and conduits on roof without fastening to the roof structure.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide **EATON; DURA-BLOK DB** series or comparable product by one of the following:
    - a. Architect and District approved equal.
- B. Size: 5 inches high x 6 inches wide x overall length.
- C. Ultimate Loads Capacity:
  1. DB5 (4.8 inches long): 200 lbs.
  2. DB10 (9.6 inches long): 500 lbs.
  3. DB20 (20.2 inches long): 1000 lbs.
  4. DB30 (30.8 inches long): 1500 lbs.
- D. Curb Base Material: 100% recycled rubber and polyurethane prepolymer. UV resistant. Each base shall have a reflective red stripe on each long side of curb base.
- E. Channel Strut: Steel strut, 1-inch high x length of curb base. Galvanized per ASTM A653.
- F. Attaching hardware: Factory installed zinc-plated nuts and bolts per ASTM B633.
- G. Pipe/Conduit Clamps: Compatible hot-dipped galvanized pipe clamps
  1. Basis-of-Design Product: Subject to compliance with requirements, provide EATON; B2000 series or comparable product by one of the following:
    - a. Architect and District approved equal.

#### 2.5 ROOF HATCH

- A. Roof Hatches: Metal roof-hatch units with lids and insulated single-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, and integrally formed deck-mounting flange at perimeter bottom.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bilco Company; Model #S-20** or comparable product by one of the following:
    - a. Babcock-Davis.
    - b. Dur-Red Products.
    - c. J. L. Industries, Inc.
    - d. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    - e. Nystrom.
    - f. O'Keeffe's Inc.
    - g. Pate Company (The).
    - h. Precision Ladders, LLC.

- B. Type and Size: Single-leaf lid, 30 by 36 inches.
- C. Loads: Minimum 40-lbf/sq. ft. external live load and 45-lbf/sq. ft. internal uplift load.
- D. Hatch Material: Zinc-coated (galvanized, G-90) steel sheet, 0.079 inch (14 gauge) thick.
  - 1. Finish: Baked enamel or powder coat.
  - 2. Color: As indicated by manufacturer's designations.
- E. Construction:
  - 1. Insulation: Glass-fiber board.
  - 2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
  - 3. Fabricate curbs to minimum height of 12 inches (8 inches minimum above roofing surface) unless otherwise indicated.
- F. Hardware: Galvanized-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside. Padlock provided by owner.
- G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.
  - 1. Height: 42 inches above finished roof deck.
  - 2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches in diameter or galvanized-steel tube, 1-5/8 inches in diameter.
  - 3. Flat Bar: Galvanized steel, 2 inches high by 3/8 inch thick.
  - 4. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter.
  - 5. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
  - 6. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
  - 7. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
  - 8. Fabricate joints exposed to weather to be watertight.
  - 9. Fasteners: Manufacturer's standard, finished to match railing system.
  - 10. Finish: Manufacturer's standard.
    - a. Color: As selected by Architect from manufacturer's full range.
- H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.
  - 1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
  - 2. Height: 42 inches above finished roof deck.
  - 3. Material: Steel tube.
  - 4. Post: 1-5/8-inch- diameter pipe.
  - 5. Finish: Manufacturer's standard baked enamel or powder coat.
    - a. Color: As selected by Architect from manufacturer's full range.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
  - 1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
  - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
  - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
  - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
  - 2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
- D. Pipe and Conduit Support Installation:
  - 1. Install pipe and conduit supports on a roofing compatible Walkway Pad per Project Manual Specification that is a minimum 2 inches larger on all sides of the support.
  - 2. Use properly sized clamps to suit pipe/conduit sizes.
- E. Roof-Hatch Installation:



1. Install roof hatch so top surface of hatch curb is level.
2. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
3. Attach safety railing system to roof-hatch curb.
4. Attach ladder-assist post according to manufacturer's written instructions.

F. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

### 3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09 91 00 " Painting and Finishing."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

**END OF SECTION 07 72 00**

**SECTION 07 84 13 - PENETRATION FIRESTOPPING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Penetrations in fire-resistance-rated walls.
- 2. Penetrations in horizontal assemblies.

B. Related Sections:

- 1. Section 07 84 46 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

B. California Green Building Standards Code (GBC) Submittals:

- 1. Product Data: For sealants, sealant primers, and caulks, documentation indicating that products:
  - a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 and 5.504.4.2 (2022 California Green Building Standards Code).
  - b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.
- 2. Product Data: For smaller unit sizes of sealant, sealant primer, or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):
  - a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

- C. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

- 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

- D. Qualification Data: For qualified Installer.

- E. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
  - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
    - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
    - b. Classification markings on penetration firestopping correspond to designations listed by the following:
      - 1) UL in its "Fire Resistance Directory."

#### 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

#### 1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hilti, Inc.
2. RectorSeal Corporation.
3. Specified Technologies Inc.
4. 3M Fire Protection Products.
5. Tremco, Inc.; Tremco Fire Protection Systems Group.
6. USG Corporation.

## 2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
  2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  1. Horizontal assemblies include floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
  2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
- D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. Low-Emitting Materials: Penetration firestopping sealants and sealant primers 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."
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
  1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-wool-fiber or rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Fire-rated form board.
    - d. Fillers for sealants.
  2. Temporary forming materials.
  3. Substrate primers.
  4. Collars.

5. Steel sleeves.

## 2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- J. 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, and non-sag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of non-sag grade for both opening conditions.

## 2.4 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

**3.3 INSTALLATION**

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes in contrasting color.
  - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- B. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

### 3.7 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestopping for Metallic Pipes, Conduit, or Tubing:
  - 1. UL-Classified Systems: F-A-1001-1999 (floors) and W-L-1001-1999 (walls).
  - 2. F-Rating: 1 hour minimum.
  - 3. Type of Fill Materials: As required to achieve rating.
- C. Firestopping for Nonmetallic Pipe, Conduit, or Tubing:

1. UL-Classified Systems: F-A-2001-2999 (floors) and W-L-2001-2999 (walls).
  2. F-Rating: 1 hour minimum.
  3. Type of Fill Materials: As required to achieve rating.
- D. Firestopping for Electrical Cables:
1. UL-Classified Systems: F-A-3001-3999 (floors) and W-L-3001-3999 (walls).
  2. F-Rating: 1 hour minimum.
  3. Type of Fill Materials: As required to achieve rating.
- E. Firestopping for Cable Trays with Electric Cables:
1. UL-Classified Systems: W-L-4001-4999 (walls).
  2. F-Rating: 1 hour minimum.
  3. Type of Fill Materials: As required to achieve rating.
- F. Firestopping for Insulated Pipes:
1. UL-Classified Systems: F-A-5001-5999 (floors) and W-L-5001-5999 (walls).
  2. F-Rating: 1 hour minimum.
  3. Type of Fill Materials: As required to achieve rating.
- G. Firestopping for Miscellaneous Electrical Penetrants:
1. UL-Classified Systems: F-A-6001-6999 (floors) and W-L-6001-6999 (walls).
  2. F-Rating: 1 hour minimum.
  3. Type of Fill Materials: As required to achieve rating.
- H. Firestopping for Miscellaneous Mechanical Penetrants:
1. UL-Classified Systems: F-A-7001-7999 (floors) and W-L-7001-7999 (walls).
  2. F-Rating: 1 hour minimum.
  3. Type of Fill Materials: As required to achieve rating.
- I. Firestopping for Groupings of Penetrants:
1. UL-Classified Systems: F-A-8001-8999 (floors) and W-L-8001-8999 (walls).
  2. F-Rating: 1 hour minimum.
  3. Type of Fill Materials: As required to achieve rating.

**END OF SECTION 07 84 13**



**SECTION 07 84 46 - FIRE-RESISTIVE JOINT SYSTEMS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Joints in or between fire-resistance-rated constructions.

- B. Related Sections:

- 1. Section 07 84 13 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

- 1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

- C. Qualification Data: For qualified Installer.

- D. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

- B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:

- 1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.

2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:
  - a. Fire-resistive joint system products bear classification marking of qualified testing agency.
  - b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:
    - 1) UL in its "Fire Resistance Directory."

#### 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

#### 1.6 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.
- C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

### PART 2 - PRODUCTS

#### 2.1 FIRE-RESISTIVE JOINT SYSTEMS

- A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:
  1. Joints include those installed in or between fire-resistance-rated walls.
  2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
  3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Hilti Construction Chemicals, Division of Hilti, Inc.
    - b. RectorSeal Corporation.
    - c. 3M Fire Protection Products.
    - d. Tremco, Inc.; Tremco Fire Protection Systems Group.

- C. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- D. Low-Emitting Materials: Fire-resistive joint system sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
  - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
  - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

#### 3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
  2. Apply fill materials so they contact and adhere to substrates formed by joints.
  3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Designation of applicable testing agency.
  4. Date of installation.
  5. Manufacturer's name.
  6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.
- B. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN.
- B. Wall-to-Wall, Fire-Resistive Joint Systems FRJS-1:
  - 1. UL-Classified Systems: WW-D-0000-0999.
  - 2. **Basis of Design: HW-D-0067 (Hilti; CP606)**
  - 3. Assembly Rating: 1 to 2 hours.
  - 4. Nominal Joint Width: 2 inches (maximum).
  - 5. Movement Capabilities: Class II - 12.5 percent compression or extension.
- C. Wall-to-Wall, Fire-Resistive Joint Systems FRJS-2:
  - 1. UL-Classified Systems: WW-D-0000-0999.
  - 2. **Basis of Design: HW-D-0068 (Hilti; CP606)**
  - 3. Assembly Rating: 1 to 2 hours.
  - 4. Nominal Joint Width: 2 inches (maximum).
  - 5. Movement Capabilities: Class II - 12.5 percent compression or extension.
- D. Wall-to-Wall, Fire-Resistive Joint Systems FRJS-3:
  - 1. UL-Classified Systems: WW-D-0000-0999.
  - 2. **Basis of Design: HW-D-0105 (Hilti; CP606)**
  - 3. Assembly Rating: 1 to 2 hours.
  - 4. Nominal Joint Width: 2 inches (maximum).
  - 5. Movement Capabilities: Class II or III - 19 percent compression or extension.
- E. Head-of-Wall, Fire-Resistive Joint Systems FRJS-4:
  - 1. UL-Classified Systems: HW-D 0000-0999.
  - 2. **Basis of Design: HW-D-0906 (Hilti; CFS-SP WB Firestop Joint Spray)**
  - 3. Assembly Rating: 1 to 2 hours.
  - 4. Nominal Joint Width:  $\frac{3}{4}$  inch.
  - 5. Movement Capabilities: Class II - 33 percent compression or extension.
- F. Base-of-Wall, Fire-Resistive Joint Systems FRJS-5:
  - 1. UL-Classified Systems: BW-S 0000-0999.
  - 2. **Basis of Design: BW-S-0002 (Hilti; CP 605, CP601S, CP606, CFS-S SIL GG, or FS-ONE MAX)**
  - 3. Assembly Rating: 1 to 2 hours.
  - 4. Nominal Joint Width: 1 inch (maximum).

END OF SECTION 07 84 46

**SECTION 07 92 00 - JOINT SEALANTS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Non-staining silicone joint sealants.
3. Mildew-resistant joint sealants.
4. Butyl joint sealants.
5. Latex joint sealants.

B. Related Requirements:

1. Section 07 92 19 "Acoustical Joint Sealants" for sealing joints in sound-rated construction.
2. Refer to sections of Divisions 21, 22, 23, 26, 27, and 28 for joint sealers in mechanical, electrical, and plumbing work not called for in this section.
3. Section 32 13 73 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

- C. General Performance; Except as otherwise indicated, joint sealers are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product.

- B. Installation Instructions: Manufacturer's written installation instructions for products and applications indicated for each joint-sealant product.

C. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For sealants, sealant primers, and caulks, documentation indicating that products:
  - a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 and 5.504.4.2 (2022 California Green Building Standards Code).
  - b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.
2. Product Data: For smaller unit sizes of sealant, sealant primer, or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):

- a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.
- D. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- E. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.
- F. Sample Warranties: For special warranties.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

#### 1.5 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

#### 1.6 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
  - 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  - 2. Disintegration of joint substrates from causes exceeding design specifications.
  - 3. Mechanical damage caused by individuals, tools, or other outside agents.

4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Low-Emitting Interior Sealants: Sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health's (formerly, the California Department of Health Services) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

### 2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, non-sag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
- B. Silicone, S, NS, 100/50, T, NT: Single-component, non-sag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.
- C. Silicone, S, P, 100/50, T, NT: Single-component, pourable, plus 100 percent and minus 50 percent movement capability traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 100/50, Uses T and NT.

### 2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, non-sag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

### 2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, non-sag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

### 2.5 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.



2.6 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.7 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning

operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

- a. Concrete.
  - b. Masonry.
  - c. Unglazed surfaces of ceramic tile.
  - d. Exterior insulation and finish systems.
3. Remove laitance and form-release agents from concrete.
  4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.
    - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear sealant backings.
  3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  1. Place sealants so they directly contact and fully wet joint substrates.
  2. Completely fill recesses in each joint configuration.
  3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

### 3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### 3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces **JS-1**.
  - 1. Joint Locations:
    - a. Isolation and contraction joints in cast-in-place concrete slabs.
    - b. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicon, S, P, 100/50, T.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces **JS-2**.
  - 1. Joint Locations:
    - a. Construction joints in cast-in-place concrete.
    - b. Joints in exterior porcelain tile cladding.
    - c. Joints in exterior insulation and finish systems.
    - d. Joints between metal panels.
    - e. Joints between different materials listed above.
    - f. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
    - g. Control and expansion joints in ceilings and other overhead surfaces.
    - h. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicone, nonstaining, S, NS, 100/50, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces **JS-3**.

1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.
    - b. Control and expansion joints in tile flooring.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Silicon, S, P, 100/50, T.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces **JS-4**.
1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Tile control and expansion joints.
    - c. Vertical joints on exposed surfaces of cast-in-place concrete stem walls and curbs.
    - d. Other joints as indicated on Drawings.
  2. Joint Sealant: Silicone, nonstaining, S, NS, 100/50, NT.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement **JS-5**.
1. Joint Locations:
    - a. Control joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Acrylic latex.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces **JS-6**.
1. Joint Locations:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Tile control and expansion joints where indicated.
    - c. Inside corners of ceramic tile walls and wainscot surfaces.
    - d. Perimeter joints between interior ceramic tile wall surfaces and frames of interior doors.
    - e. Other joints as indicated on Drawings.
  2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Concealed mastics **JS-7**.
1. Joint Locations:
    - a. Aluminum thresholds.

- b. Sill plates.
  - c. Other joints as indicated on Drawings.
- 2. Joint Sealant: Butyl-rubber based.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

**END OF SECTION 07 92 00**

**SECTION 07 92 19 - ACOUSTICAL JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes acoustical joint sealants.
- B. Related Requirements:
  - 1. Section 07 92 00 "Joint Sealants" for elastomeric, latex, and butyl-rubber-based joint sealants for non-acoustical applications.

**1.3 SUBMITTALS**

- A. Product Data: For each acoustical joint sealant.
- B. California Green Building Standards Code (GBC) Submittals:
  - 1. Product Data: For acoustical sealants, sealant primers, and caulks, documentation indicating that products:
    - a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 and 5.504.4.2 (2022 California Green Building Standards Code).
    - b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.
  - 2. Product Data: For smaller unit sizes of acoustical sealant, sealant primer, or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):
    - a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Acoustical-Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.
- E. Product Test Reports: For each kind of acoustical joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- F. Sample Warranties: For special warranties.

**1.4 WARRANTY**

- A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.
- B. Low-Emitting Interior Sealants: Acoustical sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

### **2.2 ACOUSTICAL JOINT SEALANTS**

- A. Acoustical Sealant for Exposed Joints: Manufacturer's standard non-sag, paintable, non-staining latex acoustical sealant complying with ASTM C 834.
  - 1. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
- B. Acoustical Sealant for Concealed Joints: Manufacturer's standard non-sag, nondrying, nonhardening, non-skinning, non-staining, gunnable, synthetic-rubber acoustical sealant.

### **2.3 MISCELLANEOUS MATERIALS**

- A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or

by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

**3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS**

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

**3.4 CLEANING**

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

**3.5 PROTECTION**

- A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

**END OF SECTION 07 92 19**



**SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section "Flush Wood Doors".
4. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
5. Division 08 Section "Door Hardware".
6. Division 08 Section "Access Control Hardware".
7. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.

13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

### 1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
  1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
  2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
  3. Smoke Control Door Assemblies: Comply with NFPA 105.
    - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

#### 1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

#### 1.6 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
  1. CECO Door Products (C).
  2. Curries Company (CU).

#### 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

**2.3 HOLLOW METAL DOORS**

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
  
- B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard polyurethane. Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value of 3.2 or better.
  - 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
  - 4. Vertical Edges: Vertical edges to have the face sheets spot welded and filled full height with an epoxy filler. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
  - 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
  - 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
  - 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
  
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Design: Flush panel.
    - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
  - 2. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
  - 3. Vertical Edges: Vertical edges to have the face sheets spot welded and filled full height with an epoxy filler. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
  - 4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
  - 5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
  - 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

## 2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
  - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  - 2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
  - 3. Manufacturers Basis of Design:
    - a. Curries Company (CU) - M Series.
- C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
  - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
  - 3. Manufacturers Basis of Design:
    - a. Curries Company (CU) - M Series.
- D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

## 2.5 FRAME ANCHORS

- A. Jamb Anchors: All anchors welded to frame.
  - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
  - 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
  - 3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.6 LOUVERS

- A. Metal Louvers: Anemostat PLSL unless noted otherwise.
  - 1. Blade Type: Vision proof inverted V or inverted Y.
  - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

- B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.
  - 1. Manufacturers: Subject to compliance with requirements, provide louvers to meet rating indicated.
  - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

## 2.7 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

## 2.8 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.9 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
  - 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
  - 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
  - 3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-

performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
  - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
9. Jamb Anchors: Provide number and spacing of anchors as follows:
  - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches on-center and as follows:
    - 1) Two anchors per jamb up to 60 inches high.
    - 2) Three anchors per jamb from 60 to 90 inches high.
    - 3) Four anchors per jamb from 90 to 120 inches high.
    - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
  - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    - 1) Three anchors per jamb up to 60 inches high.
    - 2) Four anchors per jamb from 60 to 90 inches high.
    - 3) Five anchors per jamb from 90 to 96 inches high.
    - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
    - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

10. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
  11. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

## 2.10 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

## PART 3 - EXECUTION

### 3.1 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. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.



- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.
- E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

### 3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
  - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

### 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.

- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

### 3.5 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
  - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

**END OF SECTION 08 11 13**

**SECTION 08 14 16 - FLUSH WOOD DOORS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

A. Section Includes:

- 1. Solid-core doors with wood-veneer faces.
- 2. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

- 1. Section 08 11 13 "Hollow Metal Doors and Frames" for flush wood doors in steel frames.
- 2. Section 08 71 00 "Door Hardware" for door hardware for flush wood doors.
- 3. Section 08 80 00 "Glazing" for glass view panels in flush wood doors.
- 4. Section 09 91 00 "Painting and Finishing" for field finishing doors.

**1.3 SUBMITTALS**

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings.
- B. Installation Instructions: Manufacturer's written installation instructions for each type of product.
- C. California Green Building Standards Code Submittals:
  - 1. Laboratory Test Reports: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Laboratory Test Reports: For composite wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
  - 1. Dimensions and locations of blocking.
  - 2. Dimensions and locations of mortises and holes for hardware.
  - 3. Dimensions and locations of cutouts.
  - 4. Undercuts.
  - 5. Fire-protection ratings for fire-rated doors.

- F. Samples for Verification:
  - 1. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
  - 2. Louver blade and frame sections, 6 inches long, for each material and finish specified.
  - 3. Frames for light openings, 6 inches long, for each material, type, and finish required.

G. Sample Warranty: For special warranty.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

#### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

#### 1.6 WARRANTY

- A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
    - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
  - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
  - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Graham-Maiman Series Wood Door Products; a Masonite Architectural company.
  - 2. ABS – American Building Supply – Doormerica; a Jeld-Wen Company
  - 3. VT Industries, Heritage Collection
  - 4. Haley Brothers, Inc.
  - 5. Oregon Door
  - 6. Oshkosh Door Company
  - 7. Vancouver Door Company
- B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
  - 1. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
- B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
  - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
  - 3. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
- E. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- F. Particleboard-Core Doors:
  - 1. Particleboard: ANSI A208.1, Grade LD-2, made with binder containing no urea-formaldehyde.
- G. Mineral-Core Doors:
  - 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
  - 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
    - a. 5-inch top-rail blocking.
    - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
    - c. 5-inch midrail blocking, in doors indicated to have armor plates.
    - d. 5-inch midrail blocking, in doors indicated to have exit devices.
  - 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
    - a. Screw-Holding Capability: 550 lbf per WDMA T.M.-10.

## 2.3 DOORS FOR OPAQUE FINISH

### A. Interior Solid-Core Doors:

1. Grade: Custom.
2. Faces: Paint Grade Birch.
3. Exposed Vertical and Top Edges: Paint Grade Birch.
4. Core: Particleboard.
5. Construction: Five plies. Stiles and rails are bonded to core and then entire unit is abrasive planed before veneering.

## 2.4 LIGHT FRAMES AND LOUVERS

### A. Metal Frames for Light Openings Doors: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.

### B. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with the flush wood door manufacturer's written instructions.

### C. Metal Security Louvers: Provide louvers for door, where indicated, which comply with SDI 111C.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Anemostat; a Mestek company; PLSL.
  - b. Air Louvers Inc.; 1500-A.
  - c. L&L Louvers Inc.; SZ-70AS
2. Blade Type: Vision-proof, inverted Y.
3. Metal and Finish: Hot-dip galvanized steel, Frame & Grille: minimum 0.096-inch-thick (12 gauge), Louver Blades: minimum 0.040-inch-thick (18 gauge), factory primed for paint finish.

## 2.5 FABRICATION

### A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with NFPA 80 requirements for fire-rated doors.

### B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

### C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."

3. Louvers: Factory install louvers in prepared openings.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
  1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Hardware: For installation, see Section 08 71 00 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
  1. Install fire-rated doors according to NFPA 80.
  2. Install smoke- and draft-control doors according to NFPA 105.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
  1. Clearances: Provide 1/8 inch) at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
    - a. Comply with NFPA 80 for fire-rated doors.
    - b. 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
  2. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

#### 3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

**END OF SECTION 08 14 16**

**SECTION 08 31 13 - ACCESS DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

A. Section Includes:

- 1. Access doors and frames for walls and ceilings.

B. Related Requirements:

- 1. Section 07 72 00 "Roof Accessories" for roof hatches.
- 2. Section 22 00 00 "Basic Plumbing Requirements" for plumbing systems access doors and panels.
- 3. Section 23 00 00 "Basic HVAC Requirements" for heating and air-conditioning access doors and panels.

**1.3 SUBMITTALS**

A. Product Data: For each type of product.

- 1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings:

- 1. Include plans, elevations, sections, details, and attachments to other work.
- 2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Package and ship according to manufacturer's recommendations. Provide additional sealed plastic wrapping for factory finished access doors.

- B. Inspect access doors upon delivery for damage. Remove and replace damaged items.

- C. Store access doors at building site under cover in dry area out of direct sunlight. Place units on wood sills at least 4 inches high, or otherwise store on floors in manner that will prevent rust and damage. Avoid use of non-vented plastic or canvas shelters, which could create humidity chamber.



PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Stainless Steel Access doors shall be provided in Toilet Room walls.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

1. Acudor Products, Inc.
2. Babcock-Davis.
3. Elmdor/Stoneman Manufacturing Co.; Div. of Acorn Engineering Co.
4. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
5. Karp Associates, Inc.
6. Larsen's Manufacturing Company.
7. Milcor Inc.
8. Nystrom, Inc.
9. Williams Bros. Corporation of America (The).

- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

- C. Flush Access Doors with Exposed Flanges (Keynote #08 31 13.A1):

1. Basis-of-Design Product: Nystrom, Inc.; Flush Door Series: Model NT
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Wall and ceiling.
4. Door Size: As Indicated on Drawings.
5. Metallic-Coated Steel Sheet for Door: Nominal 0.079 inch, 14 gauge.
  - a. Finish: Factory prime.
6. Frame Material: Same material and finish as door.
  - a. Finish: Nominal 0.064, 16 gauge.
7. Hinges: Concealed Continuous Piano Type.
8. Hardware: Key operated cylinder cam lock with 2 keys per lock, keyed alike.

- D. Flush Access Doors with Exposed Flanges (Keynote #08 31 13.A2):

1. Basis-of-Design Product: Nystrom, Inc.; Flush Door Series: Model NT
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Wall and ceiling.
4. Door Size: As Indicated on Drawings.
5. Stainless-Steel Sheet for Door: Nominal 0.078 inch, 14 gauge.
  - a. Finish: No. 4.
6. Frame Material: Same material and finish as door.

- a. Thickness: Nominal 0.062 inch, 16 gauge
  7. Hinges: Concealed Continuous Piano Type.
  8. Hardware: Key operated cylinder cam lock with 2 keys per lock, keyed alike.
- E. Flush Access Doors with Concealed Flanges (Keynote #08 31 13. A3):
1. Basis-of-Design Product: Nystrom, Inc.; Flush Door Series: Model NW.
  2. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
  3. Locations: Wall and ceiling.
  4. Door Size: As Indicated on Drawings.
  5. Metallic-Coated Steel Sheet for Door: Nominal 0.079 inch, 14 gauge.
    - a. Finish: Factory prime.
  6. Frame Material: Same material as door .
    - a. Thickness: Nominal 0.064 inch, 16 gauge.
  7. Hinges: Concealed Continuous Piano Type.
  8. Hardware: Key operated cylinder cam lock with 2 keys per lock, keyed alike.
- F. Flush Access Doors with Concealed Flanges (Keynote #08 31 13.A4):
1. Basis-of-Design Product: Nystrom, Inc.; Flush Door Series: Model NW.
  2. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
  3. Locations: Wall.
  4. Door Size: As Indicated on Drawings.
  5. Stainless-Steel Sheet for Door: Nominal 0.078 inch, 14 gauge.
    - a. Finish: No. 4.
  6. Frame Material: Same material as door.
    - a. Thickness: Nominal 0.062 inch, 16 gauge.
  7. Hinges: Concealed Continuous Piano Type.
  8. Hardware: Key operated cylinder cam lock with 2 keys per lock, keyed alike.
- G. Recessed Access Doors (Keynote #08 31 13.A8):
1. Basis-of-Design Product: Nystrom, Inc.; Recessed Access Door Series: Model RA.
  2. Assembly Description: Fabricate door in the form of a pan recessed 5/8 inch acoustical tile infill. Provide frame with no bead for acoustical tile installation.
  3. Locations: Ceiling.
  4. Door Size: As indicated on drawings.
  5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gauge.
    - a. Finish: Factory prime.
  6. Frame Material: Same material and thickness as door.

7. Hinges: Concealed Continuous Piano Type.
8. Hardware: Key operated cylinder cam lock with 2 keys per lock, keyed alike.

H. Exterior Flush Access Doors (Keynote #08 31 13.A5):

1. Basis-of-Design Product: Nystrom, Inc. Exterior Access Doors Series: Model XT.
2. Assembly Description: Fabricate door to be weatherproof and fit flush to frame. Provide manufacturer's standard 2-inch- thick foam insulation and extruded door gaskets. Provide manufacturer's standard-width frame for surface mounting, proportional to door size.
3. Locations: Wall and ceiling.
4. Door Size: As indicated on Drawings.
5. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch, 20 gauge.
  - a. Finish: Factory prime.
6. Frame Material: 6063-T5 extruded aluminum, 0.080 inch, Mill.
7. Hinges: Stainless Steel Continuous Piano Type.
8. Hardware: 1/4 Turn Lock with 2 removable keys.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.
- E. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- F. Frame Anchors: Same type as door face.
- G. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
  1. For concealed flanges with drywall bead, provide edge trim for gypsum board and gypsum base securely attached to perimeter of frames.

2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
3. Provide mounting holes in frames for attachment of units to metal or wood framing.
4. Provide mounting holes in frame for attachment of masonry anchors.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.

E. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

## 2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

E. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
  - a. Run grain of directional finishes with long dimension of each piece.
  - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
  - c. Directional Satin Finish: No. 4.

F. Aluminum Finishes:

1. Mill finish.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

**END OF SECTION 08 31 13**

**SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Exterior storefront framing.
- 2. Exterior manual-swing entrance doors.
- 3. Interior storefront framing with manual-swing doors.

B. Related Requirements:

- 1. Section 08 71 00 "Finish Hardware" for aluminum-framed entrance hardware.
- 2. Section 08 80 00 "Glazing" for insulated glazing units for aluminum-framed entrances and storefronts.

1.3 SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. California Green Building Standards Code Submittals:

- 1. Laboratory Test Reports: For glazing sealants used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

- 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
- 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
  - a. Joinery, including concealed welds.
  - b. Anchorage.
  - c. Expansion provisions.
  - d. Glazing.
  - e. Flashing and drainage.
- 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
  - E. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
  - F. Qualification Data: For Installer.
  - G. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
    - 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
  - H. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
  - I. Sample Warranties: For special warranties.
- 1.4 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.
- 1.5 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
  - B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
    - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
  - C. Accessibility Requirements: For door hardware on entrance doors required to be accessible, comply with applicable provisions in CCR Title 24, Part 2, California Building Code – Accessibility Standards.
    - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 pounds.
    - 2. Hand-activated hardware such as lever latchsets, panic bars, push-pull handles, and lever handle thumb-turn dead bolts shall be mounted between 34" to 44" above finish floor.
    - 3. Comply with the following maximum opening-force requirements:
      - a. Exterior, Entrance Doors: 5 pounds applied perpendicular to entrance door.
    - 4. Thresholds: The floor or landing shall not be more than ½ inch lower than the threshold of the doorway. Change in level between ¼ inch and ½ inch shall be beveled with a slope no greater than one unit vertical in two units horizontal (50 percent slope).

5. Adjust door closers sweep periods (Delayed Action Feature) so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum, measured to the leading edge of the door.

#### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Structural failures including, but not limited to, excessive deflection.
- b. Noise or vibration created by wind and thermal and structural movements.
- c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- d. Water penetration through fixed glazing and framing areas.
- e. Failure of operating components.

2. Warranty Period: Two years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a California registered structural engineer to design aluminum-framed entrances and storefronts.

- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:

- a. Thermal stresses transferring to building structure.
- b. Glass breakage.
- c. Noise or vibration created by wind and thermal and structural movements.
- d. Loosening or weakening of fasteners, attachments, and other components.
- e. Failure of operating units.

- C. Structural Loads:

1. Wind Loads:

- a. Basic Design Wind Speed (3-sec gust):  $V = 95$  mph.



- b. Nominal Design Wind Speed (3-sec gust):  $V = 74$  mph.
    - c. Exposure Category: C.
    - d. Component level wind pressure: 20.8 psf in field and 23.9 psf within 10'-0" of the corners of the building.
  2. Seismic Loads:
    - a. Seismic Importance Factor ( $I_e$ ): 1.0
    - b. Short Period Design Spectral Response Acceleration ( $S_{DS}$ ): 0.590g
  3. Seismic Loads: Exterior Nonstructural Wall Elements and Connections (ASCE/SEI 7-16 Table 13.5-1)
    - a. Wall Element:  $a_p = 1.0$  and  $R_p = 2.5$
    - b. Body of wall panel connections:  $a_p = 1.0$  and  $R_p = 2.5$
    - c. Fasteners of the connecting system:  $a_p = 1.0$  and  $R_p = 1.0$
- D. Deflection of Framing Members: At design wind pressure, as follows:
  1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
    - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
- E. Structural: Test according to ASTM E 330 as follows:
  1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
  1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft..
  2. Entrance Doors:
    - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
    - b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10.0 lbf/sq. ft..
- H. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and Chapter 16A of the 2022 California Building Code.
- I. Energy Performance: Certify and label energy performance according to NFRC as follows:
  1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.36 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
  2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.23 as determined according to NFRC 200.
  3. Condensation Resistance Factor: When tested to AAMA Specification 1503, the CRF shall not be less than 68 (frame) and 68 (glass: low-e).
- J. Noise Reduction: Test according to ASTM E 90, with ratings determined by ASTM E 1332, as follows.
  1. Outdoor-Indoor Transmission Class (OITC): Minimum 30.
- K. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
  1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
  2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5 for a minimum of 3 cycles.
    - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
    - b. Low Exterior Ambient-Air Temperature: 0 deg F.
    - c. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

## 2.2 MANUFACTURERS

- A. Basis-of-Design Product (Exterior Application): Subject to compliance with requirements, provide Kawneer North America; Trifab 451 UT or comparable product by one of the following:
  1. Oldcastle Building Envelope.
  2. Arcadia, Inc.
  3. EFCO Corporation.
  4. US Aluminum.
- B. Basis-of-Design Product (Interior Application): Subject to compliance with requirements, provide Kawneer North America; Trifab 451 or comparable product by one of the following:
  1. Oldcastle Building Envelope.
  2. Arcadia, Inc.
  3. EFCO Corporation.
  4. US Aluminum.
- C. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing, and accessories, from single manufacturer.

## 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Construction (Exterior Application): Thermally broken.
  - 2. Construction (Interior Application): Nonthermally broken.
  - 3. Glazing System: Retained mechanically with gaskets on four sides.
  - 4. Glazing Plane: Center.
  - 5. Finish: Color anodic finish.
  - 6. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Materials:
  - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209.
    - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    - c. Extruded Structural Pipe and Tubes: ASTM B 429.
    - d. Structural Profiles: ASTM B 308.
  - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
    - a. Structural Shapes, Plates, and Bars: ASTM A 36.
    - b. Cold-Rolled Sheet and Strip: ASTM A 1008.
    - c. Hot-Rolled Sheet and Strip: ASTM A 1011.

## 2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
  - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
  - 2. Door Design: Wide stile; 5-inch nominal width.
  - 3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
    - a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 08 71 00 "Door Hardware" and on drawings.

2.6 GLAZING

- A. Glazing: Comply with Section 08 80 00 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Sealants used inside the weatherproofing system shall comply with the testing and product 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."

2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  - 2. Reinforce members as required to receive fastener threads.
  - 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
  - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.

4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate components for assembly using screw-spline system.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

### 3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.

4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 08 80 00 "Glazing."

G. Install weatherseal sealant according to Section 07 92 00 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

### 3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:
  - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
  - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
  - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

**END OF SECTION 08 41 13**

**SECTION 08 41 23 - FIRE RATED STEEL FRAMED SYSTEMS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Fire rated glazing and framing systems for installation as full vision fire rated doors, sidelights, borrowed lights, windows, and Transoms or wall sections in interior openings

B. Related Sections:

1. Section 05 12 00 "Structural Steel Framing:" Steel attachment members
2. Section 05 50 00 "Metal Fabrications:" Steel attachment members inserts and anchors
3. Section 07 84 00 "Firestopping:" Firestops between work of this section and other fire resistive assemblies.
4. Section 08 11 13 "Hollow Metal Doors and Frames." Hollow Metal doors prepped for the work of this section.
5. Section 08 71 00 "Door Hardware:" Door hardware other than that provided by the work of this section
6. Section 08 71 13 "Automatic Door Operators" opener for door to comply with ADA and Local Authority opening force requirements.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA)

1. AAMA 501.1-2005: Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure
2. AAMA 501.2-2003: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
3. AAMA 501.5-2005: Test Method for Thermal Cycling of Exterior Walls
4. AAMA 1503-1998: Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections
5. AAMA 2603-2002 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
6. AAMA 2604-2005 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
7. AAMA 2605-2005 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. American Society for Testing and Materials (ASTM):

1. Fire safety related:
  - a. ASTM E119: Methods for Fire Tests of Building Construction and Materials.
2. Material related
  - a. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2007.



- b. ASTM A 1011/A 1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2006b.
  - 3. Exterior related
    - a. ASTM E 283-04: Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen
    - b. ASTM E 330-02: Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference Procedure A
    - c. ASTM E 331-04: Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
    - d. ASTM E 783-02: Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors
    - e. ASTM E 1105-00: 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
  - 4. Sound related:
    - a. ASTM E 90-04: Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
    - b. ASTM E 413-04: Standard Classification for Rating Sound Insulation
- C. American Welding Society (AWS)
  - 1. AWS D1.3 - Structural Welding Code - Sheet Steel; 2007
- D. Builders Hardware Manufacturers Association, Inc
  - 1. BHMA A156 - American National Standards for door hardware; 2006 (ANSI/BHMA A156).
- E. National Fire Protection Association (NFPA):
  - 1. NFPA 80: Standard for Fire Doors and Windows.
  - 2. NFPA 251: Standard of Methods of Fire Tests of Building Construction & Materials
  - 3. NFPA 252: Standard of Methods of Fire Tests of Door Assemblies
  - 4. NFPA 257: Standard for Fire Test of Window Assemblies
- F. Underwriters Laboratories, Inc. (UL):
  - 1. UL 9: Fire Tests of Window Assemblies
  - 2. UL 10 B: Fire Tests of Door Assemblies
  - 3. UL 10 C: Positive Pressure Fire Tests of Window & Door Assemblies
  - 4. UL 263: Fire tests of Building Construction and Materials
  - 5. UL 752: Ratings of Bullet-Resistant Materials
- G. American National Standards Institute (ANSI):
  - 1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings
- H. Consumer Product Safety Commission (CPSC):
  - 1. CPSC 16 CFR 120: Safety Standard for Architectural Glazing Materials
- I. American Society of Civil Engineers (ASCE)

1. ASCE 7 – Minimum Design Loads for Buildings and Other Structures; 2005

1.3 DEFINITIONS

- A. Manufacturer: A firm that produces primary glass, fabricated glass or framing as defined in referenced glazing publications.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 30 00 - Administrative Requirements.
- B. Product Data:
  1. Technical Information: Submit latest edition of manufacturer's product data providing product descriptions, technical data, Underwriters Laboratories, Inc. listings and installation instructions.
- C. Shop Drawings:
  1. Include plans, elevations and details of product showing component dimensions; framed opening requirements, dimensions, tolerances, and attachment to structure
- D. Hardware schedule: list of manufacture supplied hardware and verification of cylinder size complying with Section 08 71 00
- E. Samples (optional): For following products:
  1. Glass sample-as provided by manufacturer
  2. Sample of frame
  3. Verification of sample of selected finish
- F. Glazing Schedule: Use same designations indicated on drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- G. Warranties: Submit manufacturer's warranty.
- H. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements.
  1. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to
  1. International Accreditation Service for a Type A Third-Party Inspection Body (Field Services ICC-ES Third-Party Inspections Standard Operating Procedures, 00-BL-S0400 and S0401)
  2. International Accreditation Service for Testing Body-Building Materials and Systems
    - a. Fire Testing
      - 1) ASTM Standard E 119
      - 2) CPSC Standard 16 CFR 1201
      - 3) NFPA Standards 251, 252, 257
      - 4) UL Standards 9, 10B, 10C, 1784, UL Subject 63
      - 5) BS 476; Part 22: 1987
      - 6) EN 1634-1

- B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).
  - C. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
  - D. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
  - E. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 252, ASTM E119. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.
  - F. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 257, ASTM E119. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.
  - G. Fire-Rated Wall Assemblies: Assemblies complying with ASTM E119 that are classified and labeled by UL, for fire ratings indicated, based on testing in accordance with UL 263, ASTM E119.
  - H. Listings and Labels - Fire Rated Assemblies: Under current follow-up service by Underwriters Laboratories® maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.
  - I. Regulatory Requirements: Comply with provisions of the following:
    - 1. Where indicated to comply with accessibility requirements, comply with 2022 CBC, Chapter 11B Accessibility to Public Buildings and as follows:
      - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
      - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
        - 1) Accessible doors no more than 5 lbf (22.2 N) push or pull force
        - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction, not to exceed 15 pounds
    - 2. 2022 CBC, Chapter 10 Means of Egress: Comply with the following for fire rated means of egress doors:
      - a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
      - b. Door Closers: Not more than 15 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
- 1.6 DELIVERY, STORAGE AND HANDLING
- A. Deliver, store and handle under provisions specified by manufacturer.
- 1.7 PROJECT CONDITIONS
- A. Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner coordinate planned measurements with the work of other sections.

1. Note whether field or planned dimensions were used in the creation of the shop drawings.
  - B. Coordinate the work of this section with others effected including but not limited to: other interior and/or exterior envelope components and door hardware beyond that provided by this section
- 1.8 WARRANTY
- A. Provide the Pilkington Pyrostop® and the Fireframes® Heat Barrier Series standard five-year manufacturer warranty.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS - FIRE RATED DOOR, WINDOW, AND WALL ASSEMBLY

- A. Manufacturer Glazing Material: "Pilkington Pyrostop®" fire-rated glazing as manufactured by the Pilkington Group and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) e-mail [tgp.sales@allegion.com](mailto:tgp.sales@allegion.com), web site <http://www.fireglass.com>
- B. Frame System: "Fireframes® Heat Barrier Series" fire-rated [steel] frame system as manufactured and supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) e-mail [tgp.sales@allegion.com](mailto:tgp.sales@allegion.com) web site <http://www.fireglass.com>
- C. Substitutions: Substitutions per 01 60 00.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire Rating Requirements
  1. Duration -- Doors: Capable of providing a fire rating for 90 minutes.
  2. Duration-- Windows: Capable of providing a fire rating for 120 minutes.
  3. Duration-- Walls: Capable of providing a fire rating for 120 minutes
- B. Design Requirements
  1. Dimensions – Door and Framing:
    - a. Door framing face dimension: 2-3/16-inch.
    - b. Depth of door framing: 2-9/16-inch.
    - c. Door style face dimension: 3-/11/16-inch.
    - d. Door cross rail (if applicable) face: 4-1/8-inch.
    - e. Depth of stile, header, sill and cross rail: 2-3/16-inch
  2. Dimensions -- Window Assembly:
    - a. Perimeter framing face dimension: 3-1/8-inch at head, sill and jamb.
    - b. Horizontal and/or vertical mullions: 4-1/8-inch on the face.
    - c. Depth of perimeter and mullion: depth varies based on rating and profile
  3. Construction: Narrow-profile, roll-formed steel architectural grade specialty fire doors. Conventional break-shape type hollow metal steel fire-rated doors will not be considered an acceptable substitute for the Fireframes Heat Barrier Series doors specified in this section as they do not conform to the project design intent and/or aesthetic and quality standards.
    - a. Knock down frames are not permitted.
- C. Structural Performance

1. Design and size the system to withstand structural forces placed upon it without damage or permanent set when tested in accordance with ASTM E330 using load 1.5 times the design wind loads and of 10 seconds in duration.
2. Member deflection: Limit deflection of the edge of the glass normal to the plane of the glass to 1/175 of the glass edge length or 3/4 inch, whichever is less of any framing member
3. Accommodate movement between storefront and adjoining systems

**2.3 MATERIALS - GLASS**

- A. Fire Rated Glazing: Composed of multiple sheets of Pilkington Optiwhite™ low iron, high-visible-light transmission glass laminated with an intumescent interlayer.
- B. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
- C. Properties Interior Glazing

Property				
Fire Rating	<del>60 minute</del>		90 minute	120 minute
Manufacturer's designation	<del>60-101</del>	<del>60-201</del>	90-102	120-104
Glazing type	<del>single</del>	<del>Single</del>	single	IGU
Nominal Thickness	<del>7/8" (23mm)</del>	<del>1-1/16" (27mm)</del>	1-7/16" (37mm)	2-1/8" (54mm) [with 8 mm spacer, or 2-3/8" (60 mm) with 14 mm spacer]
Weight in lbs/sf	<del>10.86</del>	<del>12.9</del>	17.61	21.71
Daylight Transmission	<del>87%</del>	<del>86%</del>	84%	75%
Sound Transmission Coefficient	<del>41dB</del>	<del>44dB</del>	45dB	46dB

- D. Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacture, testing laboratory (UL), fire rating period, safety glazing standards, and date of manufacture.
- E. Glazing Accessories: Manufacturer's standard compression gaskets, spacers, setting blocks and other accessories necessary for a complete installation.

**2.4 MATERIALS – STEEL FRAMES AND DOORS**

- A. Steel Framing System 120 min:
  1. Frame: Steelprofiled formed tubing permanently joined with steel bolts.
  2. Insulation: Insulate framing system against effects of fire, smoke, and heat transfer from either side. Insulate profiled steel tubing using a shell construction that incorporates Promatect-H intermediate interlayer. Firmly pack perimeter of framing system to rough opening with mineral wool fire stop insulation or appropriately rated intumescent sealant.
  3. Steel Glazing Beads: Extruded steel beads with dimensions recommended by manufacturer to securely hold glazing material in place.
  4. Fasteners: Type recommended by manufacturer
  5. Glazing Accessories: Set Pilkington Pyrostop glass using calcium silicate or setting blocks.
  6. Glazing Gaskets, Compounds and tapes: Glaze Pilkington Pyrostop glass with approved EPDM glazing gaskets and closed cell PVC tape, or pure silicone sealant.
- B. Steel Door System 90 min:
  1. Manufacturer's standard single leaf and double leaf doors with manufacture's standard hardware
  2. Coordinate door hardware with cylinder specified in Section 08 71 00 Hardware

**2.5 FABRICATION**

- A. Furnish exterior frame assemblies pre-welded.
  - 1. When necessary, splice frames too large for shop fabrication or shipping or to fit in available building openings.
  - 2. Fit with suitable fasteners.
  - 3. Knock-down door perimeter frames are not permitted
- B. Furnish interior frame assemblies “K-D” (or welded upon request).
  - 1. When necessary, splice frames too large for shop fabrication or shipping or to fit in available building openings.
  - 2. Fit with suitable fasteners.
  - 3. Knock-down door perimeter frames are not permitted
- C. Field glaze door and frame assemblies.
- D. Factory prepare steel door assemblies and install all hardware.
- E. Fabrication Dimensions: Fabricate fire rated assembly to field dimensions.
- F. Obtain approved Shop Drawings prior to fabrication.

**2.6 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish frames after assembly.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

**2.7 POWDERCOAT FINISHES**

- A. Finish after fabrication.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.
- C. Interior and Exterior Steel Finishes (Note: this finish is suitable for exterior exposed portions of the wall systems, including extruded aluminum covers)
  - 1. Powder-Coat Finish: Polyester Super Durable powder coating which meets AAMA 2604 for chalking and fading. Apply manufacturer's standard powder coating finish system applied to factory-assembled frames before shipping, complying with manufacturer's recommended instructions for surface preparation including pretreatment, application, and minimum dry film thickness.
  - 2. Color and Gloss: As selected by Architect from manufacturer's full range.
  - 3. Acceptable Manufacturers:
    - a. Tiger Drylac
    - b. Additional manufacturers as approved by TGP

**2.8 DOOR HARDWARE FOR SINGLE AND PAIRED DOORS**

- A. Furnish hardware with 90 minute fire door by the manufacturer. Select hardware from door manufacturer's standard recommended and approved hardware groups as specified in Division 8 Section “Door Hardware”.
  - 1. All hardware BHMA Certified

- B. Provide power assisted hardware for use at any door that cannot meet the opening force(s) required by code noted in Part I above.
  - 1. High energy, power-operated doors must meet the requirements of ANSI/BHMA A156.10 and power-assisted low energy doors must comply with ANSI/BHMA 156.19
- C. Operating hardware for Fireframes® Heat Barrier Series **Single Outswing Doors with Exit Device**. Each to have the following.

	<b>Item</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Finish*</b>
3	Hanging Devices	Weld on Pivots	Technical Glass Products	PTM
1	Exit Device	35A-F Rim	Von Duprin	626
1	Lever Trim	360 L Rectangular Lever Handle	Von Duprin	626
1	Cylinder	ANSI Mortise Schlage C Keyway	Technical Glass Products	626
1	Closer	4040XP Surface Mounted	LCN	689
1	Auto door Bottom	420APKL Smoke Seal	Pemko	MA
1	Weather Seal	Perimeter Gasket	Technical Glass Products	

Balance of hardware by others

**\* FINISH LEGEND:**

PTM Painted to match frame

MA Mill Finish Aluminum

689 Aluminum Paint

630 Satin Stainless Steel

626 Satin Chrome Plated

**2.9 ACCESSORY MATERIALS**

- A. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates and members to which the work of this section attaches or adjoins prior to frame installation.
- B. Provide openings plumb, square and within allowable tolerances.
  - 1. The manufacturer recommends 3/8-inch shim space at all walls
- C. Notify Architect of any conditions which jeopardize the integrity of the proposed fire wall / door system.
- D. Do not proceed until such conditions are corrected.

**3.2 INSTALLATION**

- A. See Fireframes Heat Barrier Installation Manual

**3.3 REPAIR AND TOUCH UP**

- A. Limited to minor repair of small scratches. Use only manufacturer's recommended products.
  - 1. Such repairs shall match original finish for quality or material and view.

B. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged.

3.4 ADJUSTING

A. Adjust door function and hardware for smooth operation. Coordinate with other hardware suppliers for function and use of any other attached hardware.

3.5 PROTECTION AND CLEANING

A. Protect glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

1. Do not clean with astringent cleaners. Use a clean "grit free" cloth and a small amount of mild soap and water or mild detergent.

2. Do not use any of the following:

a. Steam jets

b. Abrasives

c. Strong acidic or alkaline detergents, or surface-reactive agents

d. Detergents not recommended in writing by the manufacturer

e. Do not use any detergent above 77 degrees F

f. Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.

g. Metal or hard parts of cleaning equipment must not touch the glass surface

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION



**SECTION 08 51 13 - ALUMINUM WINDOWS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes aluminum windows for exterior locations.
- B. Related Requirements:
  - 1. Section 07 24 19 "EIFS" for Window Flashing System.
  - 2. Section 07 62 00 "Sheet Metal Flashing and Trim."
  - 3. Section 07 92 00 "Joint Sealants".
  - 4. Section 08 41 13 "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.
  - 5. Section 08 80 00 "Glazing" for Insulated Dual Glazing Units.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include plans, elevations, sections, accessories, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.
- E. Qualification Data: For manufacturer and Installer.
- F. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- G. Sample Warranties: For manufacturer's warranties.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Failure to meet performance requirements.
    - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
    - c. Faulty operation of movable sash and hardware.
    - d. Deterioration of materials and finishes beyond normal weathering.
    - e. Failure of insulating glass.
  2. Warranty Period:
    - a. Window: 10 years from date of Substantial Completion.
    - b. Aluminum Finish: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **All-Weather Architectural Aluminum; Series 5000** or comparable product by one of the following:
1. Thermal Windows, Inc.; Series 850
  2. EFCO Corporation; a Pella company.
  3. Win-Vent Architectural; Series 350
- B. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
1. Window Certification: AMMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
1. Minimum Performance Class: C.
  2. Minimum Performance Grade: 50.
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.48 Btu/sq. ft. x h x deg F.
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.28.
- E. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering

calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F material surfaces.

F. Outside-Inside Transmission Class (OITC): Rated for not less than 30 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

## 2.3 ALUMINUM WINDOWS

A. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Awning

B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Integral extrusion wall thickness: 0.094 inches.

2. Nominal web thickness: 1/8 inch.

3. Include full perimeter exterior snap in glazing stops.

4. Corners of frame and ventilators: Mitered and welded; muntin and intermediate bars attached to cross joints and abutting sash sections.

5. Operating Sash: Mitered, corner keyed and crimped frames.

C. Insulating-Glass Units: See Section 08 80 00 "Glazing."

D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

E. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

F. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

## 2.4 ACCESSORIES

A. For awning windows: 4 bar heavy duty stainless steel concealed hinges, die cast zinc cam handles with pole ring.

B. Weatherstripping: 64A durometer black santoprene bulb insert.

C. Subsills: Thermally broken extruded-aluminum subsills in configurations indicated on Drawings.

D. Column Covers: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

E. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

F. Window Flashing System: ASTM E 2112 and AAMA 2400-02

1. Refer to Section 07 24 19 "EIFS."

## 2.5 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash.
  - 1. Type and Location: Half, inside for project-out sashes.
  - 2. Screen Hardware: Plastic wicket doors
- B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
  - 1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
  - 2. Frame Color: Match window frames.
- C. Glass-Fiber Mesh Fabric: 18-by-16 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D 3656.
  - 1. Mesh Color: Manufacturer's standard.

## 2.6 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Windows to be Inside Glazed to allow removal of glazing from within the building.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

## 2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.8 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

- B. Class I, Clear Anodized Finish: AA DAF-45 complying with AAMA 611.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION**

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112 and AAMA 2400-02.
- B. Ensure operable windows are closed and locked during installation.
- C. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction. Install window flashing system per manufacturer's written installation instructions.
- D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

#### **3.3 ADJUSTING, CLEANING, AND PROTECTION**

- A. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
  - 1. Keep protective films and coverings in place until final cleaning.
- B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- C. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

**END OF SECTION 08 51 13**

**SECTION 08 71 00 - DOOR HARDWARE**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Sliding doors.
  - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Electromechanical door hardware.
  - 3. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Division 08 Section "Hollow Metal Doors and Frames".
  - 2. Division 08 Section "Flush Wood Doors".
  - 3. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC - International Building Code.
  - 3. NFPA 70 - National Electrical Code.
  - 4. NFPA 80 - Fire Doors and Windows.
  - 5. NFPA 101 - Life Safety Code.
  - 6. NFPA 105 - Installation of Smoke Door Assemblies.
  - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
  - 1. ANSI/BHMA Certified Product Standards - A156 Series.
  - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
  - 3. ANSI/UL 294 - Access Control System Units.
  - 4. UL 305 - Panic Hardware.
  - 5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  - 3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
    - h. Warranty information for each product.
  - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
  - 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
    - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    - b. Complete (risers, point-to-point) access control system block wiring diagrams.
    - c. Wiring instructions for each electronic component scheduled herein.
  - 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying

system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

- A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
  1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
  2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. California Building Code: Provide hardware that complies with CBC Section 11B.
  1. All openings as a part of an accessible route shall comply with CBC Section 11B-404.
  2. The clear opening width for a door shall be 32" minimum. For a swinging door it shall be measured between the face of the door and the stop, with the door open 90 degrees. There



- shall be no projections into it below 34" and 4" maximum projections into it between 34" and 80" above the finish floor or ground. Door closers and stops shall be permitted to be 78" minimum above the finish floor or ground. CBC Section 11B-404.2.3.
3. Operable hardware on accessible doors shall comply with CBC Section 11B-309.4 and shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. Operable parts of such hardware shall be 34" minimum and 44" maximum above finish floor or ground. Where sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides.
  4. Hardware (including panic hardware) shall not be provided with "nightlatch" function for any accessible doors or gates unless the following conditions are met:
    - a. Such hardware has a 'dogging' feature and is dogged during the time the facility is open.
    - b. All 'dogging' operation is performed only by employees as their job function (non-public use).
  5. The force for pushing or pulling open a door shall be in accordance with CBC Section 11B-404.2.9.
    - a. Interior hinged doors, sliding or folding doors, and exterior hinged doors: 5 pounds (22.2 N) maximum. Required fire doors: the minimum opening force allowable by the DSA authority, not to exceed 15 pounds (66.7N). These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.
    - b. The force required for activating any operable parts, such as lever hardware, or disengaging other devices shall be 5 pounds (22.2N) maximum to comply with CBC Section 11B-309.4.
    - c. The 5 pound (22.2 N) maximum force shall be validated for the size of the door used. The Building Materials Listing of the California State Fire Marshal shall indicate that the door hardware meets the 5 pound (22.2 N) force and shall also list the largest door that can be used.
  6. Door closing speed shall comply with CBC Section 11B-404.2.8. Closers shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds minimum. Spring hinges shall be adjusted so that the required time to move a door from an open position of 70 degrees to the closed position is 1.5 seconds minimum.
  7. Floor stops shall not be located in the path of travel and 4" maximum from walls.
  8. Thresholds shall comply with CBC Section 11B-404.2.5.
- G. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
  2. Plans for existing and future key system expansion.
  3. Requirements for key control storage and software.
  4. Installation of permanent keys, cylinder cores and software.
  5. Address and requirements for delivery of keys.

- I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
  - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
  - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  - 3. Review sequence of operation narratives for each unique access controlled opening.
  - 4. Review and finalize construction schedule and verify availability of materials.
  - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- J. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

#### 1.7 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

#### 1.8 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
1. Structural failures including excessive deflection, cracking, or breakage.
  2. Faulty operation of the hardware.
  3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
  3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
    - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
  4. Hinge Options: Comply with the following:
    - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
  5. Manufacturers:
    - a. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.2 POWER TRANSFER DEVICES

- A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets with a 1-year warranty. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
1. Manufacturers:
    - a. McKinney (MK) - QC (# wires) Option.
- B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
1. Provide one each of the following tools as part of the base bid contract:
    - a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
    - b. McKinney (MK) - Connector Hand Tool: QC-R003.
  2. Manufacturers:
    - a. McKinney (MK) - QC-C Series.

2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
  2. Furnish dust proof strikes for bottom bolts.
  3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
  4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
  5. Manufacturers:
    - a. Rockwood (RO).
- B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.
1. Manufacturers:
    - a. Rockwood (RO).

- C. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
  2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
  3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
  4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
  5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
  6. Manufacturers:
    - a. Rockwood (RO).

#### 2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
1. Threaded mortise cylinders with rings and cams to suit hardware application.
  2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  4. Tubular deadlocks and other auxiliary locks.
  5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  6. Keyway: Match Facility Restricted Keyway.
- C. Small Format Interchangeable Cores: Provide small format interchangeable cores (SFIC) as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
  2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
  3. Existing System: Field verify and key cylinders to match Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2)
  2. Master Keys (per Master Key Level/Group): Five (5).
  3. Construction Keys (where required): Ten (10).
- F. Construction Keying: Provide construction master keyed cylinders.

2.5 MORTISE LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.
1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - ML2000 Series.
    - b. Sargent Manufacturing (SA) - 8200 Series.

2.6 CYLINDRICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.
1. Electromechanical locksets shall have the following functions and features:
    - a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
    - b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
    - c. Options to be available for request-to-exit or enter signaling, latchbolt and deadbolt monitoring.
    - d. Two-year limited warranty on electrified functions.
  2. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - CLX3300 Series.
    - b. Sargent Manufacturing (SA) - 10X Line.

2.7 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
  4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  2. Strikes for Bored Locks and Latches: BHMA A156.2.
  3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
  4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
  - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
  - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide exit devices with functions and features as follows:
  - a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
  - b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
  - c. No catch points: addition of applied deflectors or other added components are not allowed.
  - d. No visible plastic.
  - e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.
  - f. Constructed of all stainless steel.
  - g. Stainless steel pullman type latch with deadlock feature.
  - h. Narrow or wide style exterior trim as specified in the hardware sets.

- i. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.
  - j. Ten-year limited warranty for mechanical features.
2. Electromechanical exit devices shall have the following functions and features:
    - a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
    - b. Wire routing for all non-access control electromechanical functions and EcoFlex trim to be contained within the carrier of the device eliminating the need for cavities in doors to be drilled. Include a protective film so that wires don't get damaged if the rail needs to be removed.
    - c. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
    - d. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
    - e. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
  3. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - PED4000 / PED5000 Series.
    - b. Sargent Manufacturing (SA) - PE80 Series.
- C. Extruded Aluminum Removable Mullions: ANSI/BHMA A156.3 anodized, removable mullions with malleable-iron top and bottom retainers. Mullions to be provided standard with stabilizers and imbedded weatherstrip.
1. Manufacturers:
    - a. Same as exit device manufacturer.

## 2.9 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
  2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
  4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.



B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Heavy duty surface mounted door closers shall have a 30-year warranty.
2. Manufacturers:
  - a. Corbin Russwin Hardware (RU) - DC6000 Series.
  - b. Norton Rixson (NO) - 7500 Series.
  - c. Sargent Manufacturing (SA) - 351 Series.

## 2.10 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:
  - a. Rockwood (RO).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
  - a. Norton Rixson (RF).
  - b. Rockwood (RO).
  - c. Sargent Manufacturing (SA).

## 2.11 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
  - 1. Pemko (PE).

## 2.12 ELECTRONIC ACCESSORIES

- A. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.
  - 1. Manufacturers:
    - a. Alarm Controls (AK) - SREX Series.
    - b. Securitron (SU) - XMS Series.

## 2.13 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

## 2.14 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

**3.2 PREPARATION**

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

**3.3 INSTALLATION**

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

#### 3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
  - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

#### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

#### 3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

#### 3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

#### 3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
  - 1. Quantities listed are for each pair of doors, or for each single door.
  - 2. The supplier is responsible for handling and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

**B. Manufacturer's Abbreviations:**

1. MK - McKinney
2. RO - Rockwood
3. SA - SARGENT
4. AD - Adams Rite
5. AT - Accurate Lock and Hardware
6. OT - Other
7. HS - HES
8. RF - Rixson
9. NO - Norton
10. PE - Pemko
11. ZE - Zero International
12. SU - Securitron

**Hardware Sets**

**Set: 1.0**

Doors: 100, 101, 102

6 Hinge (heavy weight)	T4A3386 NRP	US32D	MK
2 Electric Hinge (heavy weight)	T4A3386-QCxx	US32D	MK
1 Mullion	650A	US28	SA
1 Rim Exit Device	LD 18 5CH 55 56 PE8504 862	US32D	SA
1 Rim Exit Device	LD 18 5CH 55 56 PE8510 862	US32D	SA
3 Cylinder	Schlage SFIC Primus - Verify		OT
2 Surface Closer	PR7500 DA	689	NO
2 Drop Plate	As Required	689	NO
2 Door Stop	471 EXP	US26D	RO
1 Gasket	By Door Manufacturer		
2 Sweep	315CN	AI	PE
1 Threshold	Per Detail & Field Conditions x FHSL	AI	PE
2 Frame Harness	QC-C__x (length as required)		MK
2 Door Harness	QC-C__x (length as required)		MK
1 Power Supply	AQDx (size as reqd)		SU
1 Card Reader	By Security Contractor		

Notes: Fail-secure exit device – door normally closed and locked.

Presenting authorized credential to reader on wall retracts latchbolts on both panics allowing doors to be pulled open.

REX switch in panic rails signals access control system of authorized egress.

Free egress at all times via exit device.  
 During loss of power, door remains locked.

**Set: 2.0**

Doors: 103

2 Hinge (heavy weight)	T4A3386 NRP	US32D	MK
1 Electric Hinge (heavy weight)	T4A3386-QCxx	US32D	MK
1 Rim Exit Device	LD 18 5CH 55 56 PE8504 862	US32D	SA
2 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	PR7500 DA	689	NO
1 Drop Plate	As Required	689	NO
1 Door Stop	471 EXP	US26D	RO
1 Gasket	By Door Manufacturer		
1 Sweep	315CN	AI	PE
1 Threshold	Per Detail & Field Conditions x FHSL	AI	PE
1 Frame Harness	QC-C__x (length as required)		MK
1 Door Harness	QC-C__x (length as required)		MK
1 Power Supply	AQDx (size as reqd)		SU
1 Card Reader	By Security Contractor		

Notes: Fail-secure exit device – door normally closed and locked.  
 Presenting authorized credential to reader on wall momentarily retracts latchbolt on panic allowing door to be pulled open.  
 REX switch in panic rail signals access control system of authorized egress.  
 Free egress at all times via exit device.  
 During loss of power, door remains locked.

**Set: 3.0**

Doors: 104

3 Hinge (heavy weight)	T4A3386 NRP	US32D	MK
1 Rim Exit Device	LD 5CH PE8804 FSW	US32D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	CPS7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Gasketing	319CR		PE
1 Sweep	315CN	AI	PE
1 Threshold	Per Detail & Field Conditions x FHSL	AI	PE

**Set: 4.0**

Doors: 004

7 Hinge, Full Mortise	TA2714	US26D	MK
1 Electric Hinge	TA2714 QCxx	US26D	MK

1 Auto Flush Bolt Set	2842 / 2942	US32D	RO
1 Dust Proof Strike	570	US26D	RO
1 Lever Operator (inside trim)	4600 03-Square	US32D	AD
1 Electrified Deadlatch	4300	628	AD
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Pull	RM201 Mtg-Type 12XHD	US32D	RO
1 Coordinator	2600 x FB x Mtg Brkts	US28	RO
2 Surface Closer	7500 DA	689	NO
2 Drop Plate	As Required	689	NO
2 Door Stop	471 EXP	US26D	RO
1 Gasket	By Door Manufacturer		
1 Frame Harness	QC-C__x (length as required)		MK
1 Door Harness	QC-C__x (length as required)		MK
1 Motion Sensor (REX)	XMS		SU
1 Power Supply	AQDx (size as reqd)		SU
1 Card Reader	By Security Contractor		

Notes: Fail-secure lockset – door normally closed and locked.  
Presenting authorized credential to reader on wall releases latchbolt allowing door to be opened.  
Motion sensor signals access control system of authorized egress.  
Free egress at all times via inside lever.  
During loss of power, door remains locked.

**Set: 5.0**

Doors: 006, 006.2

2 Hinge, Full Mortise	TA2714	US26D	MK
1 Electric Hinge	TA2714 QCxx	US26D	MK
1 Lever Operator (inside trim)	4600 03-Square	US32D	AD
1 Electrified Deadlatch	4300	628	AD
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Pull	RM201 Mtg-Type 12XHD	US32D	RO
1 Surface Closer	7500 DA	689	NO
1 Drop Plate	As Required	689	NO
1 Door Stop	409 / 441H	US32D	RO
1 Gasket	By Door Manufacturer		
1 Frame Harness	QC-C__x (length as required)		MK
1 Door Harness	QC-C__x (length as required)		MK
1 Motion Sensor (REX)	XMS		SU
1 Power Supply	AQDx (size as reqd)		SU
1 Card Reader	By Security Contractor		

Notes: Fail-secure lockset – door normally closed and locked.  
Presenting authorized credential to reader on wall releases latchbolt allowing door to be opened.  
Motion sensor signals access control system of authorized egress.

Free egress at all times via inside lever.  
During loss of power, door remains locked.

**Set: 6.0**

Doors: 106, 111, 120, 121

4 Hinge (heavy weight)	T4A3786	US26D	MK
1 Rim Exit Device	16 18 5CH PE8504 862	US32D	SA
2 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	PR7500 DA	689	NO
1 Drop Plate	As Required	689	NO
1 Door Stop	409 / 441H	US32D	RO
1 Gasket	By Door Manufacturer		

**Set: 7.0**

Doors: 114, 119, 209, 213, 216

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Electric Hinge	TA2714 QCxx	US26D	MK
1 Fail Secure Lockset	Accurate M8859E AE 39L 1R	32D	AT
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	7500 DA	689	NO
1 Drop Plate	As Required	689	NO
1 Door Stop	409 / 441H	US32D	RO
1 Gasket	By Door Manufacturer		

Notes: Fail-secure lockset – door normally closed and locked.  
Presenting authorized credential to reader on wall momentarily releases outside lever allowing door to be opened.  
REX switch in inside lever signals access control system of authorized egress.  
Free egress at all times via inside lever.  
During loss of power, door remains locked.

**Set: 8.0**

Doors: 208, 308

8 Hinge (heavy weight)	T4A3786	US26D	MK
2 Push Pull Bar Set	RM251 Mtg-Type 12XHD	US32D	RO
2 Surface Closer	7500 DA	689	NO
2 Drop Plate	As Required	689	NO
2 Door Stop	409 / 441H	US32D	RO
1 Gasket	By Door Manufacturer		

**Set: 9.0**

Doors: 117, 201, 217, 301, 311



3 Hinge (heavy weight)	T4A3786	US26D	MK
1 Electric Hinge	T4A3786 QCxx	US26D	MK
1 Fail Secure Exit Device	12 5CH 55 PE8876 WEL	US32D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
1 Gasketing	S44BL		PE
1 Frame Harness	QC-C__x (length as required)		MK
1 Door Harness	QC-C__x (length as required)		MK
1 Power Supply	AQDx (size as reqd)		SU
1 Card Reader	By Security Contractor		

Notes: Fail-secure exit device – door normally closed and locked.  
Presenting authorized credential to reader on wall momentarily unlocks outside lever, allowing door to be opened.  
REX switch in exit device signals the access control system of authorized exit.  
Free egress at all times via the exit device.  
During loss of power, door remains locked.

**Set: 10.0**

Doors: 008

2 Hinge (heavy weight)	T4A3786	US26D	MK
1 Electric Hinge	T4A3786 QCxx	US26D	MK
1 Fail Secure Exit Device	LD 5CH PE8876 WEL	US32D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
3 Silencer	608		RO
1 Frame Harness	QC-C__x (length as required)		MK
1 Door Harness	QC-C__x (length as required)		MK
1 Power Supply	AQDx (size as reqd)		SU
1 Card Reader	By Security Contractor		

Notes: Fail-secure exit device – door normally closed and locked.  
Presenting authorized credential to reader on wall momentarily unlocks outside lever, allowing door to be opened.  
REX switch in exit device signals the access control system of authorized exit.  
Free egress at all times via the exit device.  
During loss of power, door remains locked.

**Set: 11.0**

Doors: 105

4 Hinge (heavy weight)	T4A3786	US26D	MK
1 Rim Exit Device	12 5CH PE8813 WEL	US32D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	PR7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
1 Gasketing	S44BL		PE

**Set: 12.0**

Doors: 001, 007

4 Hinge (heavy weight)	T4A3786	US26D	MK
1 Rim Exit Device	12 5CH PE8813 WEL	US32D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	CPS7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
1 Gasketing	S44BL		PE

**Set: 13.0**

Doors: 005

5 Hinge (heavy weight)	T4A3786	US26D	MK
1 Electric Hinge	T4A3786 QCxx	US26D	MK
1 Auto Flush Bolt, top only	2840 / 2940	US32D	RO
1 Fail Secure Lock	RX 70 10XG71 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Coordinator	2600 x FB x Mtg Brkts	US28	RO
2 Surface Closer	7500 DA	689	NO
2 Kickplate	K1050 10" High x CSK	US32D	RO
2 Door Stop	409 / 441H	US32D	RO
1 Astragal	357C		PE
1 Astragal	S772BL		PE
1 Gasketing	S88BL		PE
1 Gasketing	332CR		PE
2 Auto Door Bottom	STC411APK		PE
1 Frame Harness	QC-C__x (length as required)		MK
1 Door Harness	QC-C__x (length as required)		MK
1 Power Supply	AQDx (size as reqd)		SU
1 Card Reader	By Security Contractor		

Notes: Fail-secure lockset – door normally closed and locked.  
Presenting authorized credential to reader on wall momentarily releases outside lever allowing door to be

opened.  
 REX switch in inside lever signals access control system of authorized egress.  
 Free egress at all times via inside lever.  
 During loss of power, door remains locked.

**Set: 14.0**

Doors: 004.1, 011

5 Hinge, Full Mortise	TA2714	US26D	MK
1 Electric Hinge	TA2714 QCxx	US26D	MK
1 Auto Flush Bolt Set	2842 / 2942	US32D	RO
1 Dust Proof Strike	570	US26D	RO
1 Fail Secure Lock	RX 70 10XG71 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Coordinator	2600 x FB x Mtg Brkts	US28	RO
2 Surface Closer	7500 DA	689	NO
2 Kickplate	K1050 10" High x CSK	US32D	RO
2 Door Stop	409 / 441H	US32D	RO
1 Astragal	357C		PE
2 Silencer	608		RO
1 Frame Harness	QC-C__x (length as required)		MK
1 Door Harness	QC-C__x (length as required)		MK
1 Power Supply	AQDx (size as reqd)		SU
1 Card Reader	By Security Contractor		

Notes: Fail-secure lockset – door normally closed and locked.  
 Presenting authorized credential to reader on wall momentarily releases outside lever allowing door to be opened.  
 REX switch in inside lever signals access control system of authorized egress.  
 Free egress at all times via inside lever.  
 During loss of power, door remains locked.

**Set: 15.0**

Doors: 006.1

2 Hinge, Full Mortise	TA2714	US26D	MK
1 Electric Hinge	TA2714 QCxx	US26D	MK
1 Fail Secure Lock	RX 70 10XG71 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
3 Silencer	608		RO
1 Frame Harness	QC-C__x (length as required)		MK
1 Door Harness	QC-C__x (length as required)		MK

1 Power Supply	AQDx (size as reqd)	SU
1 Card Reader	By Security Contractor	

Notes: Fail-secure lockset – door normally closed and locked.  
 Presenting authorized credential to reader on wall momentarily releases outside lever allowing door to be opened.  
 REX switch in inside lever signals access control system of authorized egress.  
 Free egress at all times via inside lever.  
 During loss of power, door remains locked.

**Set: 16.0**

Doors: 109, 205, 305

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Electric Hinge	TA2714 QCxx	US26D	MK
1 Fail Secure Lock	RX 70 10XG71 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	CPS7500 DA	689	NO
3 Silencer	608		RO
1 Frame Harness	QC-C__x (length as required)		MK
1 Door Harness	QC-C__x (length as required)		MK
1 Power Supply	AQDx (size as reqd)		SU
1 Card Reader	By Security Contractor		

Notes: Fail-secure lockset – door normally closed and locked.  
 Presenting authorized credential to reader on wall momentarily releases outside lever allowing door to be opened.  
 REX switch in inside lever signals access control system of authorized egress.  
 Free egress at all times via inside lever.  
 During loss of power, door remains locked.

**Set: 17.0**

Doors: 118

8 Hinge, Full Mortise	TA2714	US26D	MK
1 Self-Latching Flush Bolt Set	2845 / 2945	US32D	RO
1 Dust Proof Strike	570	US26D	RO
1 Storeroom Lock	70 10XG04 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
2 Door Stop	409 / 441H	US32D	RO
1 Overlapping Astragal	355CV		PE
2 Silencer	608		RO

**Set: 18.0**

Doors: 017, 018

6 Hinge, Full Mortise	TA2714	US26D	MK
1 Auto Flush Bolt Set	2842 / 2942	US32D	RO
1 Dust Proof Strike	570	US26D	RO
1 Storeroom Lock	70 10XG04 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Coordinator	2600 x FB x Mtg Brkts	US28	RO
1 Surface Closer	7500 DA	689	NO
1 Surface Closer	CPS7500 DA	689	NO
2 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
1 Overlapping Astragal	355CV		PE
2 Silencer	608		RO

**Set: 19.0**

Doors: 202

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Storeroom Lock	70 10XG04 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Door Stop	409 / 441H	US32D	RO
3 Silencer	608		RO

**Set: 20.0**

Doors: 303.1

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Storeroom Lock	70 10XG04 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Conc Overhead Stop, Adj, Std	2-x36	630	RF
3 Silencer	608		RO

**Set: 21.0**

Doors: 302

3 Hinge (heavy weight)	T4A3786	US26D	MK
1 Storeroom Lock	70 10XG04 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
3 Silencer	608		RO

**Set: 22.0**

Doors: 116, 306

4 Hinge, Full Mortise	TA2714	US26D	MK
1 Storeroom Lock	70 10XG04 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
3 Silencer	608		RO

**Set: 23.0**

Doors: 110

4 Hinge, Full Mortise	TA2714	US26D	MK
1 Storeroom Lock	70 10XG04 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	CPS7500 DA	689	NO
3 Silencer	608		RO

**Set: 24.0**

Doors: 009

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Classroom Lock	70 10XG37 LL (verify SFIC format)	US26D	SA
1 Cylinder	Schlage SFIC Primus - Verify		OT
1 Surface Closer	7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
3 Silencer	608		RO

**Set: 25.0**

Doors: 203, 204, 206, 207, 303, 304, 307

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Privacy Lock	LB V21 8265 LNL	US26D	SA
1 Surface Closer	7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
3 Silencer	608		RO

**Set: 26.0**

Doors: 002, 003, 107, 108

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Push Plate	70C 4" x 16"	US32D	RO

1 Pull Plate	107x70C (3/4"x8")	US32D	RO
1 Surface Closer	7500 DA	689	NO
1 Kickplate	K1050 10" High x CSK	US32D	RO
1 Door Stop	409 / 441H	US32D	RO
3 Silencer	608		RO

**Set: 27.0**

Doors: 004.2, 210, 211, 212, 214, 215, 309, 310

1 All Hardware By Door Manufacturer

**END OF SECTION 08 71 00**

**SECTION 08 80 00 - GLAZING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
  - 1. Glass for windows, doors, and interior borrowed lites.
  - 2. Storefront framing.
  - 3. Glazing gaskets and accessories.
- B. Related Requirements:
  - 1. Section 08 80 10 "Metal Window Panels."
  - 2. Section 08 88 13 "Fire-Resistant Glazing."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. CBC: 2022 California Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: Two (2) samples for each type of glass product other than clear monolithic vision glass; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Product Certificates: For glass and glazing products, from manufacturer.
- E. Product Test Reports: For tinted glass and insulating glass, for tests performed by a qualified testing agency.



- F. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Safety Glazing Labeling: Where safety glazing labeling is required per CCR Title 24, Part 2, California Building Code, Section 2406.3, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.9 WARRANTY

- A. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Vitro Architectural Glass.
  - b. Guardian Industries Corp.; SunGuard.
  - c. Pilkington North America.
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
  1. Obtain tinted glass from single source from single manufacturer.
  2. Obtain reflective-coated glass from single source from single manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the CBC and ASTM E 1300.
  1. Design Wind Pressures: As indicated on Drawings.
  2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
  3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Safety Glazing: Conform to CCR Title 24, Part 2, California Building Code, Chapter 24. Safety Glass shall conform to CCR Title 24, Part 2, California Building Code, Section 2406 and shall be tested in accordance to CPSC 16 CFR 1201. Glazing shall comply with the test criteria for Category I or II as indicated in Table 2406.2(1). Glazing that is not installed in doors are permitted to be tested in accordance with ANSI Z97.1. Under ANSI Z97.1, glazing shall comply with the test criteria for Class A or B as indicated in Table 2406.2(2)
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
  2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 7.3 computer program, expressed as Btu/sq. ft. x h x deg F.

4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 7.3 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

### 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
  2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing labeling is required per CCR Title 24, Part 2, California Building Code, Section 2406.3, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- E. Strength: Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

### 2.4 GLASS PRODUCTS

- A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- B. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear), Quality-Q3.
  1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
  2. For uncoated glass, comply with requirements for Condition A.
  3. For coated vision glass, comply with requirements for Condition C (other coated glass).

### 2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
  1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
  2. Spacer: Manufacturer's standard spacer material and construction.
  3. Desiccant: Molecular sieve or silica gel, or a blend of both.

**2.6 GLAZING GASKETS**

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
  - 1. Neoprene complying with ASTM C 864.
  - 2. EPDM complying with ASTM C 864.
  - 3. Silicone complying with ASTM C 1115.
  - 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone, or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
  - 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
- C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

**2.7 MISCELLANEOUS GLAZING MATERIALS**

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

**2.8 FABRICATION OF GLAZING UNITS**

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
  - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
    - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

### 3.4 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

### 3.5 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

### 3.6 MONOLITHIC GLASS SCHEDULE

- A. Glass Type GL-1: Clear, fully tempered float glass.
- B. Minimum Thickness: 6 mm.
  - 1. Safety glazing required.
- C. Glass Type GL-3: Tinted, laminated glass.
  - 1. Basis-of-Design Product: **Vitro Architectural Glass; Solargray Glass.**
  - 2. Tint Color: Gray.
  - 3. Clear laminated glass with two plies of heat-strengthened float glass.
    - a. Minimum Thickness of Each Glass Ply: 3 mm.
    - b. Interlayer Thickness: 0.030 inch.
  - 4. Winter Nighttime U-Factor: 1.00 maximum.
  - 5. Visible Light Transmittance: 40 percent minimum.
  - 6. Solar Heat Gain Coefficient: 0.54 maximum.
  - 7. Safety glazing required.

### 3.7 INSULATED SPANDREL GLASS

- A. Glass Type GL-4: Insulated spandrel glass panel. See Section 08 80 10 – “Metal Window Panels”
  - 1. Basis-of-Design Product: **Mapes Architectural Panels; Mapespan.**
  - 2. Overall Unit Thickness: 1 inch
  - 3. Outdoor Glass Exterior: ¼” tempered glass.
  - 4. Insulating Core: Iscoyanurate
  - 5. Interior Skin: Kynar finished metal on tempered hardboard substrate.

### 3.8 INSULATING GLASS SCHEDULE

- A. Glass Type GL-5: Low-E-coated, tinted, insulating glass.
  - 1. Basis-of-Design Product: **Vitro Architectural Glass; Solargray, Solarban 60 Solar Control Low-E Glass and Clear Glass.**
  - 2. Overall Unit Thickness: 1 inch.
  - 3. Minimum Thickness of Outdoor Lite: 6 mm.
  - 4. Outdoor Lite: Tinted fully tempered float glass.
  - 5. Tint Color: Gray.
  - 6. Interspace Content: Air.
  - 7. Indoor Lite: Clear fully tempered float glass.
  - 8. Low-E Coating: Sputtered on second surface.
  - 9. Minimum Thickness of Indoor Lite: 6 mm.
  - 10. Winter Nighttime U-Factor: 0.29 maximum.
  - 11. Visible Light Transmittance: 35 percent minimum.
  - 12. Solar Heat Gain Coefficient: 0.25 maximum.
  - 13. Safety glazing required.

3.9 INSULATING GLASS SCHEDULE

A. Glass Type GL-6: Low-E-coated, tinted, laminated insulating glass.

1. Basis-of-Design Product: **Vitro Architectural Glass; Solargray, Solarban 60 Solar Control Low-E Glass and Clear Glass.**
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Outdoor Lite: 6 mm.
4. Outdoor Lite: Tinted fully tempered float glass.
5. Tint Color: Gray.
6. Interspace Content: Air.
7. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.
  - a. Minimum Thickness of Each Glass Ply: 3 mm.
  - b. Interlayer Thickness: 0.030 inch.
8. Low-E Coating: Sputtered on second surface.
9. Winter Nighttime U-Factor: 0.29 maximum.
10. Visible Light Transmittance: 35 percent minimum.
11. Solar Heat Gain Coefficient: 0.25 maximum.
12. Safety glazing required.

**END OF SECTION 08 80 00**



**SECTION 08 80 10 - METAL WINDOW PANELS**

**PART 1 - GENERAL**

**1.01 - Scope**

1. The Panels required are as manufactured by Mapes Architectural Panels, LLC, Lincoln, NE. Panels consist of metal skins laminated to stabilizer substrates with an insulating core material. Panels are designed to be glazed into a window system or curtain wall system.
2. Related Work
  1. Section 07 92 00 – Joint Sealants
  2. Section 08 41 13 – Aluminum Framed Entrances and Storefronts

**1.02 - Quality Assurance**

1. Panel manufacturer shall have a minimum of 25 years of experience.
2. Field measurements shall be taken prior to completion of manufacturing and cutting.
3. Maximum deviation from vertical and horizontal alignment of installed panels is 1/8" in 20' non-commutative.

**1.03 - References**

1. American Society of Testing Materials (ASTM)
  - A. E330-84: Structural Performance of Exterior Windows, Curtain Walls and Doors under the influence of wind loads.
  - B. D1781-76: Climbing Drum Peel Test for Adhesives.
  - C. D3363-74: Method for Film Hardness by Pencil Test.
  - D. D2794-90: Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
  - E. D3359-90: Method for Measuring Adhesion by the tape test.

**1.04 - Substitutions**

1. The materials and products specified in this section establish a minimum standard of required function, design, appearance quality and warranty to be met by any proposed substitution.
2. No substitutions will be considered unless a written request for approval has been submitted by the bidder per the requirements in the Instructions to Bidders.

**1.05 - Submittals**

1. Submittals shall be in conformance with section 01 30 00 Administrative Requirements.
2. Samples:
  - A. Panel makeup - 2 samples - 10"x10"
  - B. Two samples of each color and finish texture - 3"x5"
3. Submission Drawings: Indicate thickness, dimension and components of parts. Detail glazing methods, framing and tolerances to accommodate thermal movement.
4. Affidavit certifying materials meet all requirements as specified.
5. 2 copies of manufacturers standard literature for specified material.

**1.06 - Delivery, Storage and Handling**

1. Protect finish and edge in accordance with panel manufacturer's recommendations.
2. Store materials in accordance with panel manufacturer's recommendations.

**PART 2 - PRODUCTS**

**2.01 - Panels - Laminated**

1. Laminated metal faced MapeSpan panels as manufactured by Mapes Industries, Inc.
2. Acceptable alternatives: Panels having similar composite construction and finish providing manufacturer has a minimum of 25 years panel laminating experience and comparable published warranties.

**2.02 - Finish**

1. Finishes
2. Exterior: Exterior Spandrel Glass
3. Interior: Standard Kynar
4. Color as selected by architect.

**2.03 - Panel Fabrication**

1. Exterior Substrate: N/A
2. Core: Isocyanurate
3. Interior Substrate: Tempered Hardboard
4. Tolerances - .8% of panels dimension length and width - (+/-) 1/16" thickness
5. Panel Thickness - 1"
6. R-Value - 5.96
7. U-Value - 0.17

**2.04 - Accessories**

1. Recommended for use as an infill panel component in window and curtain wall systems. Related material to complete installation as recommended by the manufacturer.
2. Seals against moisture intrusion as recommended by the manufacturer. Polyurethane and silicone-based sealant with a 20-year life are recommended.

**PART 3 - EXECUTION**

**3.01 - Installation**

1. Panel surfaces shall be free from defects prior to installation.

**3.02 - Execution**

1. Erect panels plumb, level and true.
2. Glaze panels securely and in accordance with approved shop drawings and manufacturers instructions to allow for necessary thermal movement and structural support.
3. Do not install panels that are observed to be defective including warped, bowed, dented, scratched and delaminating components.
4. Weatherseal all joints as required using methods and materials as previously specified.
5. Separate dissimilar metals using gasketed fasteners and blocking to eliminate the possibility of electrolytic reaction.

**3.03 - Adjusting and Cleaning**

1. Remove masking film as soon as possible after installation. Masking intentionally left in place after panel installation will be the responsibility of the contractor.

2. Weep holes and drainage channels must be unobstructed and free from dirt and sealant.

**END OF SECTION**

**SECTION 08 88 13 - FIRE-RESISTANT GLAZING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Fire-protection-rated glazing.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Qualification Data: For installers and glass testing agency.
- E. Product Certificates: For each type of glass and glazing product, from manufacturer.
- F. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during the remainder of the construction period.

1.9 WARRANTY

- A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

- 1. Warranty Period: Five years from date of Substantial Completion.

- B. Manufacturer's Special Warranty on Double Glazing Units with Clear Gel Fill: Manufacturer agrees to replace units that deteriorate within specified warranty period. Deterioration of double glazing units with clear gel fill is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning glass contrary to manufacturer's written instructions. Evidence of failure is the leakage of gel fill from units, air bubbles within units, or obstruction of vision by contamination or deterioration of gel.

- 1. Warranty Period: five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

- 1. GANA Publications: "Laminated Glazing Reference Manual" **and** "Glazing Manual."

- B. Safety Glazing Labeling: Where safety glazing labeling is required per CCR Title 24, Part 2, California Building Code, Section 2406.3, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall

indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

#### 2.4 GLASS PRODUCTS

- A. Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- B. Fire Rated Glazing: ASTM C 1036, Type II, Class 1 (clear), Form 1, Quality-Q6 and complying with testing requirements in 16 CFR 1201 for Category II materials.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **SaftiFirst Products; SuperLite® X-45/60/90 minute fire and safety rated glazing** or comparable product by one of the following:
    - a. TGP.

#### 2.5 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 252 or UL 10B and UL 10C, including the hose-stream test, and shall comply with NFPA 80.
  - 1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from the hose-stream test.
- B. Fire-Protection-Rated Glazing Labeling: Fire rated glazing shall be under current follow-up service by a nationally recognized independent testing laboratory approved by OSHA and maintain a current listing or certification. Assemblies shall be labeled in accordance with limits of listings.

#### 2.6 GLAZING ACCESSORIES

- A. Glazing Accessories: Manufacturer recommended fire rated glazing accessory as follows:
  - 1. Listed and labeled vision lite kits must be used.

#### 2.7 FABRICATION OF GLAZING UNITS

- A. Fabricate to approved dimensions. The general contractor shall guarantee dimensions where practicable within required tolerances.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

**3.4 TAPE GLAZING**

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

**3.5 GASKET GLAZING (DRY)**

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- D. Install gaskets so they protrude past face of glazing stops.

**3.6 SEALANT GLAZING (WET)**

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial washaway from glass.

**3.7 CLEANING AND PROTECTION**

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.



- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

**3.8 FIRE-PROTECTION-RATED GLAZING SCHEDULE**

- A. Glass Type FPGL-1: 90-minute fire-protection-rated glazing system

**END OF SECTION 08 88 13**

## **SECTION 09 21 16.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES**

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Gypsum board shaft wall assemblies.

#### 1.3 SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall and corridor ceiling assemblies.
- B. California Green Building Standards Code Submittals:
  - 1. Laboratory Test Reports: For gypsum board shaft wall systems, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Evaluation Reports: For shaft wall and ceiling assemblies, from ICC-ES or other AHJ recognized evaluation service.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

#### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

2.2 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with requirements, provide **USG (United States Gypsum Company); Shaft Wall and Ceiling System (PEI ES AER-09038 – Dated October 2021)**.
- B. A substitution of the above Basis-of-Design Product requires AHJ approval before acceptance by the architect and the school district. The cost for obtaining AHJ approval shall be at no additional cost to the school district.

2.3 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: 2 hour.
- B. STC Rating: 50, minimum.
- C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
  - 1. Depth: 2-1/2 inches, 4 inches & 6 inches (See approved drawings for size).
  - 2. Minimum Base-Metal Thickness: 0.033 inch (20 gauge).
- D. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.
  - 1. Minimum Base-Metal Thickness: 0.033 inch (20 gauge).
- E. Room-Side Finish: Gypsum board, Type X.
- F. Shaft-Side Finish: Gypsum shaftliner board, Type X.
- G. Insulation: Sound attenuation blankets.

2.4 PANEL PRODUCTS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Gypsum Shaftliner Board, Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with paper faces.
  - 1. Thickness: 1 inch.
  - 2. Long Edges: Double bevel.

- C. Gypsum Board: As specified in Section 09 29 00 "Gypsum Board."

## 2.5 NON-LOAD-BEARING STEEL FRAMING

- A. Steel Framing Members: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 unless otherwise indicated.
- B. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

## 2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 09 29 00 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
- D. Expansion Anchors: Current ICC-ES evaluation report or other acceptable evaluation report meeting the requirements of the AHJ. Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to 2022 CBC, section 1908A or 1909A; ICC-ES AC193 and ACI 318-08 greater than or equal to the design load, as determined by testing per ASTM E488 conducted by a qualified testing agency.
- E. Power-Actuated Anchors: Current ICC-ES evaluation report or other acceptable evaluation report meeting the requirements of the AHJ. Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.
- F. Sound Attenuation Blankets: As specified in Section 09 29 00 "Gypsum Board."
- G. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."
- H. Fire Resistant Joint Sealants: As specified in Section 07 84 46 "Fire-Resistive Joint Systems."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install gypsum board shaft wall to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.
- B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.
- D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices and similar items.
- E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- G. Control Joints: Install control joints at locations indicated on Drawings while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
- H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.
- I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

### 3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

**END OF SECTION 09 21 16.23**

**SECTION 09 22 16 – NON-STRUCTURAL METAL FRAMING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Metal suspended ceiling and soffit framing.
- B. Framing accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 05 40 00 - Cold-Formed Metal Framing: Requirements for wall stud framing and ceiling stud framing.
- B. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

**1.03 REFERENCE STANDARDS**

- A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.
- B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings:
  - 1. Indicate prefabricated work, component details, ceiling framing layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
- C. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Metal Framing, Connectors, and Accessories:
  - 1. CEMCO
  - 2. ClarkDietrich
  - 3. SCAFCO Corporation
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 FRAMING MATERIALS**

- A. Non-Loadbearing Framing System Components: AISI S220; sheet steel, of size and properties necessary for the spacing indicated, with maximum deflection of ceiling framing of L/240 at 5 psf (L/240 at 240 Pa).
  - 1. Ceiling Channels: C-shaped.
  - 2. Furring: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).
- B. Non-Loadbearing Framing Accessories:

1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

### **2.03 FABRICATION**

- A. Fabricate assemblies of framed sections to sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that rough-in utilities are in proper location.

### **3.02 CEILING AND SOFFIT FRAMING**

- A. Comply with requirements of ASTM C754.
- B. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- C. Install furring independent of walls, columns, and above-ceiling work.
- D. Securely anchor hangers to structural members or embed them in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- E. Space main carrying channels at maximum 48 inches on center, and not more than 6 inches from wall surfaces. Lap splice securely.
- F. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- G. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.
- H. Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.
- I. Laterally brace suspension system.

### **3.03 TOLERANCES**

- A. Maximum Variation From True Position: 1/8 inch in 10 feet.
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

**END OF SECTION**

**SECTION 09 29 00 - GYPSUM BOARD**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Interior gypsum board.
- 2. Tile backing panels.
- 3. Texture finishes.

1.3 SUBMITTALS

- A. Product Data: For each type of product.

- B. California Green Building Standards Code (GBC) Submittals:

- 1. Product Data: For adhesives used to laminate gypsum board panels to substrates, documentation indicating that products:
  - a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 (2022 California Green Building Standards Code).
  - b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.
- 2. Product Data: For smaller unit sizes of adhesives (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):
  - a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

- C. Samples: For the following products:

- 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
- 2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain gypsum board products from a single manufacturer, or from manufacturer's recommended by prime manufacturers of gypsum board panels



1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Low-Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Georgia-Pacific Gypsum LLC.
  - 2. USG Corporation.
  - 3. American Gypsum.
  - 4. CertainTeed Corp.
  - 5. National Gypsum Company.
  - 6. PABCO Gypsum.
  - 7. Temple-Inland.

B. Gypsum Board, Type X: ASTM C 1396.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

#### 2.4 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
  - b. CertainTeed Corp.; GlasRoc Tile Backer.
2. Core: 5/8-inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

#### 2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:
  - a. Cornerbead.
  - b. Bullnose bead.
  - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
  - d. L-Bead: L-shaped; exposed long flange receives joint compound.
  - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
  - f. Expansion (control) joint.
  - g. Curved-Edge Cornerbead: With notched or flexible flanges.

#### 2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
  - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.

4. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

## 2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate (including concrete curbs).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Grabber Construction Products: GDWAF – Drywall Adhesive.
- b. W. W. Henry Company: Henry 317 Multipurpose Construction Adhesive.
- c. Henkel Corporation: OSI F-38 – Drywall Adhesive

C. Steel Drill Screws: ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick. Screw shall be of sufficient length to achieve penetration through metal stud flange by no fewer than 3 exposed threads or 3/8 inch (whichever is greater.)

1. Size: #6 x 1 ¼ inch (minimum).
2. Head type: #2 Phillips drive, bugle-head.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Acoustical joint 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."

F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

## 2.8 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

- a. USG Corporation; BEADEx FasTex Wall and Ceiling Spray Texture.
- b. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
- c. National Gypsum Company; Perfect Spray EM Texture.

2. Texture: Orange Peel.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  2. Fit gypsum panels around ducts, pipes, and conduits.
  3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:

1. Type X: All surfaces unless otherwise indicated.

- B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
  - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
  - b. At high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws. Unless otherwise noted on the approved drawings, screws shall be spaced not more than 12 inches o.c. for ceilings and 16 inches o.c. for walls where framing members are 16 inches o.c. Screws shall be spaced not more than 12 inches o.c. for both ceilings and walls where the framing members are 24 inches o.c. Refer to approved drawings for alternative screw spacing at fire rated assemblies.

- C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws. Unless otherwise noted on the approved drawings, for the base layer, screws shall be spaced not more than 24 inches on center for both walls and ceilings for framing

at both 16 inches and 24 inches on center. Unless otherwise noted on the approved drawings, for the face layer, screws shall be spaced not more than 12 inches o.c. for ceilings and 16 inches o.c. for walls where framing members are 16 inches o.c. Screws shall be spaced not more than 12 inches o.c. for both ceilings and walls where the framing members are 24 inches o.c. Refer to approved drawings for alternative screw spacing for the base and face layers at fire rated assemblies.

- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board and laminating adhesive manufacturers' written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

### 3.4 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

### 3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners unless otherwise indicated.
  - 2. Bullnose Bead: Use where indicated.
  - 3. LC-Bead: Use at exposed panel edges.
  - 4. L-Bead: Use where indicated.
  - 5. U-Bead: Use where indicated.
  - 6. Curved-Edge Cornerbead: Use at curved openings.

### 3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and under VFTW.
  - 2. Level 2: Panels that are substrate for tile, acoustical panels, and under FRP.

3. Level 4: At panel surfaces that will be exposed to view. **These walls and ceilings will receive an "Orange Peel" texture.**
    - a. Primer and its application to surfaces are specified in Section 09 91 00 "Painting and Finishing."
  4. Level 5: At panel surfaces that will be covered with vinyl wall covering, metal wall panels, and glass visual display panels
- E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

### 3.7 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

### 3.8 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  2. Indications that panels are mold damaged include, but are not limited to, fuzzy or blotchy surface contamination and discoloration.

**END OF SECTION 09 29 00**

**SECTION 09 30 00 – TILE**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Tile.
2. Crack isolation membrane.
3. Metal edge strips.
4. Grout.

B. Related Sections:

1. Section 07 26 50 "Vapor Emission Control System" for testing and vapor control.
2. Section 07 92 00 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
3. Section 09 29 00 "Gypsum Board" for glass-mat, water-resistant backer board.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.5, and ANSI A108.10, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. California Green Building Standards Code (GBC) Submittals:
  1. Product Data: For adhesives, sealants and caulks, documentation indicating that products:
    - a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 and 5.504.4.2 (2019 California Green Building Standards Code).
    - b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.



2. Product Data: For aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):
    - a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.
  3. Product Data: For tile flooring systems, documentation indicating that products:
    - a. Comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Samples for Verification:
1. Full-size units of each type and composition of tile and for each color and finish required.
  2. Full-size units of each type of trim and accessory for each color and finish required.
  3. Metal edge strips in 6-inch lengths.
- D. Qualification Data: For qualified Installer.
- E. Product Certificates: For each type of product, signed by product manufacturer.
- F. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to owner where directed. Obtain signed receipt from owner that indicate where materials were delivered, the date of delivery, who accepted delivery and the amount and nature of materials delivered. Include copy of signed receipt in maintenance manuals.
1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
  2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of each type from one source or producer.
1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup of floor tile installation.
  2. Build mockup of each type of wall tile installation.
  3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- D. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

### PART 2 - PRODUCTS

#### 2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. Low-Emitting Materials: Tile flooring systems shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
  - 1. Where tile is indicated for installation on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

- F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

## 2.2 TILE PRODUCTS

### A. Tile Type (TF1): Floor Tile.

1. Basis-of-Design Product: Subject to compliance with requirements, Enhance Express by Emser Tile.
2. Composition: Porcelain.
3. Module Size: 12 by 24 inches.
4. Thickness: 9 mm.
5. Face: Random.
6. Finish: Matte.
7. Tile Color and Pattern: Gray, FIXT CEMENT.
8. Grout Color: Mapei, 5047 Charcoal.
9. Grout Joint: 1/8 inch

### B. Tile Type (TF2): Floor Tile.

1. Basis-of-Design Product: Subject to compliance with requirements, BUILDING BLOCKS WOOD | OAK by Emser Tile.
2. Composition: Porcelain.
3. Module Size: 8 by 47 inches.
4. Thickness: 10 mm.
5. Face: Natural Wood Pattern.
6. Finish: Matte.
7. Tile Color and Pattern: Sand.
8. Grout Color: Mapei, 5004 Bahama Beige.

### C. Tile Type (TW1): Wall Tile.

1. Basis-of-Design Product: Subject to compliance with requirements, Enhance Express by Emser Tile.
2. Composition: Porcelain.
3. Module Size: 12 by 24 inches.
4. Thickness: 9 mm.
5. Face: Random.
6. Finish: Matte.
7. Tile Color and Pattern: Gray, FIXT CEMENT.
8. Grout Color: Mapei, 5027 Silver
9. Grout Joint: 1/8 inch

### D. Tile Type (TW2): Accent Wall Tile.

1. Basis-of-Design Product: Subject to compliance with requirements, Glitz, glass & metal mosaic tile by Emser Tile.
2. Composition: Glass and Metal Mosaic.
3. Module Size: 12 by 12 inches.
4. Thickness: 6 mm.
5. Tile Color and Pattern: Value.
6. Grout Color: Mapei, 5027 Silver
7. Grout Joint: match joint between tiles on mesh backing.

E. Tile Type (TW3): Wall Tile.

1. Basis-of-Design Product: Subject to compliance with requirements, Emerson Wood | 3D Cube Mosaic by Daltile.
2. Composition: Porcelain.
3. Module Size: 12 by 12 inches.
4. Thickness: 5/16 inch.
5. Face: Random.
6. Finish: Matte.
7. Tile Color and Pattern: Butter Pecan.
8. Grout Color: Mapei, 5027 Silver
9. Grout Joint: 1/8 inch

F. Tile Type (TW4): Wall Tile.

1. Basis-of-Design Product: Subject to compliance with requirements, RHYTM by Emser Tile.
2. Composition: Porcelain.
3. Module Size: 11 by 13 inches.
4. Thickness: 9 mm.
5. Face: 1.
6. Finish: Matte.
7. Tile Color and Pattern: White Hex.
8. Grout Color: Mapei, 5027 Silver
9. Grout Joint: 1/8 inch

G. Tile Type (TW5): Wall Tile.

1. Basis-of-Design Product: Subject to compliance with requirements, RHYTM by Emser Tile.
2. Composition: Porcelain.
3. Module Size: 11 by 13 inches.
4. Thickness: 9 mm.
5. Face: 1.
6. Finish: Matte.
7. Tile Color and Pattern: Black Hex.
8. Grout Color: Mapei, 5027 Silver
9. Grout Joint: 1/8 inch

H. Tile Type (TW6): Wall Tile.

1. Basis-of-Design Product: Subject to compliance with requirements, English Brick by Tilebar.
2. Composition: Porcelain.
3. Module Size: 2 by 18 inches.
4. Thickness: 9.55 mm.
5. Face: Random.
6. Finish: Matte.
7. Tile Color and Pattern: White.
8. Grout Color: Mapei, 5038 Avalanche
9. Grout Joint: 3/16 inch

## 2.3 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Bonsal American; an Oldcastle company; B 6000 Waterproof Membrane with Glass Fabric.
    - b. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
    - c. Laticrete International, Inc.; Laticrete Blue 92 Anti-Fracture Membrane.
    - d. MAPEI Corporation; Mapelastic HPG with MAPEI Fiberglass Mesh.
    - e. Summitville Tiles, Inc.; S-9000.

## 2.4 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
  - 1. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils thick.
  - 2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
- B. Epoxy Adhesive and Mortar Bond Coat (Thin Set): ANSI A118.3.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Kerapoxy CQ grout and mortar by Mapei
  - 2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.3.

## 2.5 GROUT MATERIALS

- A. Epoxy Grout: Two-component, 100% solids, epoxy grout with color-coated quartz; tested according ANSI A118.3 modified, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Kerapoxy CQ grout and mortar by Mapei
  - 2. Properties:
    - a. Compressive Strength: >6525 psi.
    - b. Linear Shrinkage: <0.06 percent
    - c. Water Absorption: <0.0002 lbs.

## 2.6 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 07 92 00 "Joint Sealants."

- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

## 2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; white zinc alloy or stainless-steel, ASTM A 666, 300 Series exposed-edge material.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

## 2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
  - 1. Verify that substrates for setting tile are firm, dry, clean, and free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
  - 2. Verify that concrete substrates for tile floors installed with bonded mortar bed comply with surface finish requirements in ANSI A108.01 for installations indicated.
    - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
  - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
  - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not, factory blended, either return to manufacturer or blend tiles at Project site before installing.

### 3.3 TILE INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
  - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
  - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
  - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
  - 1. Floor tile: See joint widths under tile types.
  - 2. Wall Tile: See joint widths under tile types.
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
  - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

2. Provide vertical sealant-filled joints at interior corners of wall tile.
3. Seal joint between perimeter of door frames and ceramic tile.

I. Metal Edge Strips: Install at locations indicated.

### 3.4 CRACK ISOLATION MEMBRANE INSTALLATION

A. Concrete Substrates: Prepare according to manufacturer's written instructions.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Contractor shall be responsible for scheduling the tests and performing the necessary remediation work specified in Section 07 26 50 "Vapor Emission Control System" to allow for the installation of the crack isolation membrane.
4. Proceed with installation only after substrates pass testing in Section 07 26 50 "Vapor Emission Control System" and are acceptable to the crack isolation membrane manufacturer.

B. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

C. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

### 3.5 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

### 3.6 INTERIOR TILE INSTALLATION METHODS

A. Interior Floor Installations, Concrete Subfloor:



1. Tile Installation F111: Cement mortar bed (thickset) with cleavage membrane; TCA F111 and ANSI A108.1C.
    - a. Tile Type: TF1 (Basement Restrooms).
    - b. Thin-Set Mortar for Cured-Bed Method: Epoxy mortar.
    - c. Grout: Epoxy grout.
  
  2. Tile Installation F113A: Thin-set mortar over above ground concrete slabs; TCA F113A.
    - a. Tile Type: TF1 and TF2.
    - b. Crack Isolation Membrane: Per TCA F125-Full
    - c. Thin-Set Mortar: Epoxy mortar. Mortar shall be compatible with Crack Isolation Membrane.
    - d. Grout: Epoxy grout.
- B. Interior Wall Installations, Metal Studs or Furring:
1. Tile Installation W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board; TCA W245.
    - a. Tile Type: TW1, TW2, TW3, TW4, TW5, and TW6
    - b. Thin-Set Mortar: Epoxy mortar.
    - c. Grout: Epoxy grout.

**END OF SECTION 09 30 00**

**SECTION 09 65 00 - RESILIENT FLOORING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Static control resilient tile flooring.
- C. Resilient base.
- D. Resilient stair accessories.
- E. Installation accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 26 50 – Vapor Emission Control System: Concrete slab moisture and alkalinity testing and remediation procedures.

**1.03 REFERENCE STANDARDS**

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).
- B. ASTM F970 - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading; 2022.
- C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2023.
- D. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2020.
- E. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.
- F. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015 (Reapproved 2020).

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Flooring Material: 50 square feet of each type and color.
  - 2. Extra Wall Base: 25 linear feet of each type and color.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.

- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- D. Do not double stack pallets.

#### 1.07 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 50 degrees F and below 80 degrees F.

### PART 2 PRODUCTS

#### 2.01 TILE FLOORING

- A. Vinyl Composition Tile - Type SDT1: Homogeneous, with color extending throughout thickness.
  - 1. Manufacturers:
    - a. Armstrong Flooring; Excelon SDT: [www.armstrongflooring.com/#sle](http://www.armstrongflooring.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
  - 3. Size: 12 by 12 inch.
  - 4. Thickness: 0.125 inch.
  - 5. Color: 51959 Coal.
- B. High Performance Luxury Vinyl Tile (RT1): Printed film type, with transparent or translucent wear layer.
  - 1. Manufacturers:
    - a. Milliken & Company; Lumenology, Light Wash Flexform LVT – 2.5 mm.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
  - 3. Tile Size: 25 cm x 100 cm
  - 4. Wear Layer Thickness: 0.55 mm
  - 5. Total Thickness: 2.5 mm
  - 6. Color: Spotlight
- C. High Performance Luxury Vinyl Tile (RT2): Printed film type, with transparent or translucent wear layer.
  - 1. Manufacturers:
    - a. Milliken & Company; Lumenology, Light Wash Flexform LVT – 2.5 mm.

- b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
  3. Tile Size: 25 cm x 100 cm
  4. Wear Layer Thickness: 0.55 mm
  5. Total Thickness: 2.5 mm
  6. Color: Shade
- D. High Performance Luxury Vinyl Tile (RT3): Printed film type, with transparent or translucent wear layer.
  1. Manufacturers:
    - a. Milliken & Company; Lumenology, Reflective Flexform LVT – 2.5 mm.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
  3. Tile Size: 25 cm x 100 cm
  4. Wear Layer Thickness: 0.55 mm
  5. Total Thickness: 2.5 mm
  6. Color: Defect

## 2.02 STAIR COVERING

- A. Stair Treads with Integral Risers: Rubber; full height of riser, full width and depth of tread in one piece; tapered thickness.
  1. Manufacturers:
    - a. Nora Systems, Inc.; Nornament Arago Stairtreads.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Minimum Requirements: Comply with ASTM F2169, Type TS, rubber, vulcanized thermoset.
  3. Nominal Thickness: 0.1875 inch.
  4. Nosing: Square.
  5. Striping: 2-inch-wide contrasting color abrasive strips. PERMALIGHT Photoluminescent Anti-Slip Tape #503038.
  6. Tread Texture: Smooth.
  7. Color: 5171 Fortitude.
- B. Stair Landing Flooring: Rubber.
  1. Manufacturers:
    - a. Nora Systems, Inc.; Nornament Arago Stair Flooring
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Minimum Requirements: Comply with ASTM F2169, Type TS, rubber, vulcanized thermoset.
  3. Nominal Thickness: 0.1875 inch.

4. Tread Texture: Smooth.
5. Color: 5171 Fortitude

### 2.03 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; style as scheduled.
  1. Manufacturers:
    - a. Johnsonite; a Tarkett Company; Baseworks.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Height: 4 inches.
  3. Thickness: 0.125 inch.
  4. Finish: Satin.
  5. Length: Roll.
  6. Color: VL4 Cool Metal.
  7. Accessories: Premolded external corners and internal corners.

### 2.04 RESILIENT MILLWORK CONTOURABLE WALL BASE

- A. Resilient Base: ASTM F1861, Type TP rubber, thermoplastic; style as scheduled.
  1. Manufacturers:
    - a. Johnsonite; a Tarkett Company, Millwork Monument
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Height: 4 inches or 2.5 inches.
  3. Thickness: ¼ inch
  4. Length: 8 feet.
  5. Color and Pattern: To be selected by owner from manufacturer's full range.

### 2.05 ACCESSORIES

- A. Subfloor Filler: Portland based, feather finish; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Static Dissipative Tile Adhesive: Armstrong S-202
- D. Moldings, Transition and Edge Strips: Same material as flooring.
- E. Static Dissipative Tile Polish: Armstrong S-392

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).

1. Conduct tests by an independent testing agency acceptable to Owner.
  - a. See Section 07 26 50.
2. Follow moisture and alkalinity remediation procedures in Section 07 26 50.

### **3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Prohibit traffic until filler is fully cured.
- C. Clean substrate.

### **3.03 INSTALLATION - GENERAL**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
  1. Spread only enough adhesive to permit installation of materials before initial set.
  2. Fit joints and butt seams tightly.
  3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
  1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.
  2. Resilient Strips: Attach to substrate using adhesive.
- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- G. Install flooring in recessed floor access covers, maintaining floor pattern.
- H. At movable partitions, install flooring under partitions without interrupting floor pattern.

### **3.04 INSTALLATION - TILE FLOORING**

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

### **3.05 INSTALLATION - RESILIENT BASE**

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.
- C. Scribe and fit to door frames and other interruptions.

### **3.06 INSTALLATION - STAIR COVERINGS**

- A. Install stair coverings in one piece for full width and depth of tread.
- B. Adhere over entire surface. Fit accurately and securely.

### **3.07 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.

- B. Clean in accordance with manufacturer's written instructions.

**3.08 PROTECTION**

- A. Prohibit traffic on resilient flooring for 48 hours after installation.
- B. Wait for a minimum of 7 days following installation before any wet-wash, or scrubbing the floor.

**END OF SECTION**

**SECTION 09 68 13 - TILE CARPETING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Carpet tile, fully adhered.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 74 19 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap and accessories.
- B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied flooring.
- C. Section 07 26 50 – Vapor Emission Control System: Concrete slab moisture and alkalinity testing and remediation procedures.

**1.03 REFERENCE STANDARDS**

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016 (Reapproved 2021).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2023.
- C. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Current Edition.
- D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate layout of joints.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Accessory Samples: Submit two 12-inch-long samples.
- F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and pattern weaving.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.



- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

### 1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Tile Carpeting:
  - 1. Milliken & Company; Major Frequency; Three: Unison / Impromptu / Counterbalance.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 MATERIALS

- A. Tile Carpeting, Type CPT1A: Tufted, manufactured in one color dye lot.
  - 1. Product: Counterbalance.
  - 2. Tile Size: 9.85 by 39.4 inch, nominal.
  - 3. Thickness: 0.106 inch.
  - 4. Color: Digitize.
  - 5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
  - 6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
  - 7. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
  - 8. Pile Weight: 14 oz/sq yd.
  - 9. Density Factor: 9,000 kilotex.
  - 10. Primary Backing Material: PVC-Free WellBAC Comfort Plus Cushion.
- B. Tile Carpeting, Type CPT1B: Tufted, manufactured in one color dye lot.
  - 1. Product: Impromptu.
  - 2. Tile Size: 9.85 by 39.4 inch, nominal.
  - 3. Thickness: 0.102 inch.
  - 4. Color: Digitize.
  - 5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
  - 6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
  - 7. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
  - 8. Pile Weight: 14 oz/sq yd.
  - 9. Density Factor: 8,263 kilotex.
  - 10. Primary Backing Material: PVC-Free WellBAC Comfort Plus Cushion.
- C. Tile Carpeting, Type CPT2A: Tufted, manufactured in one color dye lot.
  - 1. Product: Counterbalance.

2. Tile Size: 9.85 by 39.4 inch, nominal.
  3. Thickness: 0.106 inch.
  4. Color: Production.
  5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
  6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
  7. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
  8. Pile Weight: 14 oz/sq yd.
  9. Density Factor: 9,000 kilotex.
  10. Primary Backing Material: PVC-Free WellBAC Comfort Plus Cushion.
- D. Tile Carpeting, Type CPT2B: Tufted, manufactured in one color dye lot.
1. Product: Impromptu.
  2. Tile Size: 9.85 by 39.4 inch, nominal.
  3. Thickness: 0.102 inch.
  4. Color: Production.
  5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
  6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
  7. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
  8. Pile Weight: 14 oz/sq yd.
  9. Density Factor: 8,263 kilotex.
  10. Primary Backing Material: PVC-Free WellBAC Comfort Plus Cushion.

### 2.03 ACCESSORIES

- A. Subfloor Filler: Cementitious; type recommended by flooring material manufacturer.
- B. Edge Strips: Embossed aluminum.
- C. Adhesives:
  1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
  - 1. Conduct tests by an independent testing agency acceptable to Owner.
    - a. See Section 07 26 50.
  - 2. Follow moisture and alkalinity remediation procedures in Section 07 26 50.
- D. Verify that required floor-mounted utilities are in correct location.

### **3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

### **3.03 INSTALLATION**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in per drawings, with pile direction parallel to next unit, set parallel to building lines.
- F. Fully adhere carpet tile to substrate.
- G. Trim carpet tile neatly at walls and around interruptions.
- H. Complete installation of edge strips, concealing exposed edges.

### **3.04 CLEANING**

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- C. Clean and vacuum carpet surfaces.

**END OF SECTION**

**SECTION 09 72 00 - WALL COVERINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation and prime painting.
- B. Wall covering.

**1.02 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- B. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2020.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on wall covering and adhesive.
- C. Shop Drawings: Indicate wall elevations with seaming layout.
- D. Samples: Submit two samples of wall covering, 12 by 12 inch in size illustrating color, finish, and texture.
- E. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.
- F. Manufacturer's Installation Instructions: Indicate special procedures.
- G. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.
- H. Manufacturer's Qualification Statement.
- I. Installer's Qualification Statement.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Wall Covering Materials: 25 linear feet of each color and pattern of wall covering; store where directed.
  - 3. Package and label each roll by manufacturer, color and pattern, and destination room number.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Inspect roll materials at arrival on site, to verify acceptability.
- B. Protect packaged adhesive from temperature cycling and cold temperatures.
- C. Do not store roll goods on end.

**1.06 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.

- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

## **PART 2 PRODUCTS**

### **2.01 WALL COVERINGS**

- A. General Requirements:
  - 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
- B. Wall Covering - Type II: 100% vinyl roll stock.
  - 1. Comply with ASTM F793/F793M, Category V, Type II.
  - 2. Total Weight: 20.30 oz/sq yd.
  - 3. Roll Width: 54 inches.
  - 4. Backing: Non-woven, synthetic fabric.
  - 5. Pattern Match: Straight
  - 6. Repeat: 27.0 inches H x 25.25 inches V
  - 7. Manufacturers:
    - a. Wolf-Gordon; Broadwick Lane, BWL 8-3668, Indigo: [www.wolfgordon.com](http://www.wolfgordon.com)
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
- D. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
- E. Substrate Primer and Sealer: Alkyd enamel type.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.
- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.
- C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.

### **3.02 PREPARATION**

- A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.
- B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.
- C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.
- E. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.
- F. Vacuum clean surfaces free of loose particles.

### **3.03 INSTALLATION**

## **WALL COVERINGS**

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Apply adhesive to wall surface immediately prior to application of wall covering.
- C. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.
- D. Butt edges tightly.
- E. Horizontal seams are not acceptable.
- F. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.
- G. Do not install wall covering more than 1/4 inch below top of resilient base.
- H. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

**3.04 CLEANING**

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Reinstall wall plates and accessories removed prior to work of this section.

**END OF SECTION**

**SECTION 09 72 10 - FIBERGLASS REINFORCED PANELS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. California Green Building Standards Code (GBC) Submittals:
  - 1. Product Data: For adhesives, documentation indicating that products:
    - a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 (2022 California Green Building Standards Code).
    - b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.
  - 2. Product Data: For smaller unit sizes of adhesives (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):
    - a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.
- C. Samples for Verification: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.
  - 3. Testing Agency: UL.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Do not deliver to the job site until suitable storage space is available.

- B. Storage, Handling and Protection: Provide all work or materials necessary to store, cover and protect materials specified and installed under this Section. Store materials under cover in a well-ventilated enclosure and protect against extreme changes in temperature and humidity. Prevent marring of finished surfaces and keep materials clean during handling and installation operations. Protect exposed finish work and materials from damage after installation. Replace damaged items at no cost to Owner.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

### PART 2 - PRODUCTS

#### 2.1 PLASTIC SHEET PANELING

- A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Marlite, Inc.:** **Marlite FRP Class A** or comparable product by one of the following:
    - a. Kemlite Company Inc.
    - b. Glasteel, a division of Stabilt America, Inc.
    - c. Nudo Products, Inc.
    - d. Panolam Industries International, Inc.
  - 2. Nominal Thickness: Not less than 0.09 inch.
  - 3. Surface Finish: Molded pebble texture.
  - 4. Color: P-145 "Silver."

#### 2.2 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
  - 1. Color: Match panels.
- B. Adhesive: Water resistant and non-flammable adhesive, recommended by plastic paneling manufacturer and complying with ASTM C557.
- C. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00 "Joint Sealants."

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.



**3.2 PREPARATION**

- A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.
- B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- C. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
- D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations, but not less than 24 hours before application.
- E. Other trade work that penetrates the substrate shall be completed before beginning FRP panel application.
- F. Remove switchplates, wall plates, and surface mounted fixtures in areas where wall covering is to be applied.
- G. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches wide.
  - 1. Mark plumb lines on substrate at trim accessory locations for accurate installation.
  - 2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

**3.3 INSTALLATION**

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive. Do not fasten through panels. All trim accessories must provide for a minimum 1/8 inch of panel expansion at joints and edges, for proper installation.
- D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Replace removed plates and fixtures; verify cut edges of panels area completely concealed.
- G. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

**END OF SECTION 09 72 00**

**SECTION 09 84 00 – CEMENTITIOUS WOOD FIBER CEILINGS**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

**1.2 SUMMARY**

A. Section Includes:

1. Cementitious wood fiber plank acoustical wall and ceiling system

B. Related Sections:

1. Section 09 22 16 – Non-Structural Metal Framing
2. Section 09 29 00 –Gypsum Board

C. Alternates

1. Comply with requirements in Instructions to Bidders.
2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

**1.3 REFERENCES**

A. American Society for Testing and Materials (ASTM)

1. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
2. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
3. ASTM E2768-11(2018) Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials
4. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
5. ASTM C636 / C636M - 19 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
6. ASTM C 754 Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board
7. ASTM E 1264 Classification for Acoustical Ceiling Products
8. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

B. California Building Code

C. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

D. NFPA 70 National Electrical Code

E. California Department of Public Health CDPH/EHLB Emission Standard Method Version 1.1 2010

F. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

G. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

**1.4 SYSTEM DESCRIPTION**

- A. Direct attached acoustical (ceiling) systems manufactured from domestic cementitious wood fiber.

### 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of Tectum® Direct-Attached™ ceilings or walls required.
- B. Samples: Minimum 12-inch x 12-inch samples of specified Tectum® High NRC Direct-Attached interior panels.
- C. Shop Drawings: Layout and details of Tectum® Direct-Attached interior panels show locations of items that are to be coordinated with the installation as required.
- D. Certifications: UL certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. Acoustical performance, products must be tested to the A, D-20, C-20, or C-40 method.
- E. Country of Origin: Submittals must be accompanied by letter, label or certification indicating the manufacturing country of origin. Comply with Made in USA requirements as applicable for the project.
- F. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance as specified in Section 2.2, subcontractor shall be required to send material from every production run appearing on the job, finished as intended to be installed, to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

### 1.6 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate UL markings.
  - 1. Surface Burning Characteristics: Tested per ASTM E 84 and complying with ASTM E 1264 Classification.
- B. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and fire sprinklers.

### 1.7 DELIVERY, STORAGE & HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Provide labels indicating brand name, style, size and thickness.
- C. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- D. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

### 1.8 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
- B. Do not install ceiling panels until building is closed in and HVAC system is operational.
- C. Locate materials onsite at least 72 hours before beginning installation to allow materials to reach temperature and moisture content equilibrium.
- D. Maintain the following conditions in areas where acoustical materials are to be installed 72 hours before, during and after installation:
  - 1. Relative Humidity: 25 - 85%.
  - 2. Uniform Temperature: 32 - 120 degrees F (0 - 49 degrees C).

### 1.9 WARRANTY

- A. Tectum® High NRC Direct-Attached Wall and Ceiling Panels: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but

are not limited to the following:

1. Defects in materials or factory workmanship.
- B. Tectum® High NRC Direct-Attached Wall and Ceiling Panels warranty - Thirty (30) years from date of substantial completion.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

## 1.10 MAINTENANCE

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
  1. Tectum® High NRC Direct-Attached Wall and Ceiling Panels: Furnish quality of full-size units equal to 5.0 percent of amount installed.

## PART 2 PRODUCTS

### 2.1 Manufacturer

- A. Tectum® DesignArt – Lines High NRC Ceiling and Wall Panels:
  1. Tectum® by Armstrong World Industries, Inc.
- B. Suspension System and Accessories:
  1. Section 09 22 16 – Non-Structural Metal Framing

### 2.2 TECTUM® DIRECT-ATTACHED CEILING PANELS

- A. Acoustical Panels Type AP-1:
  1. Surface Texture: Coarse
  2. Composition: Aspen wood fibers bonded with inorganic hydraulic cement
  3. Finish: Surface appearance shall be consistent from panel to panel
  4. Color: Coffee (TCE)
  5. Size: Standard 24" x 48"
  6. Thickness: 1"
  7. Edge Profile: Beveled on direct -attach)
  8. UL Classified Noise Reduction Coefficient (NRC): ASTM C 423; D-20(0.60) Classified with UL label.
  9. UL Classified Flame Spread: ASTM E 1264; Class A. Product must be able to meet this criteria after being painted six times.
  10. Dimensional Stability/Mold Resistance: HumiGuard Plus and no significant mold growth when tested by ASTM D3273.
  11. Acceptable Product: Tectum® DesignArt – Linge High NRC Ceiling and Wall Panels as manufactured by Armstrong World Industries
    - a. Product Number: 6347D14t10 – 24 x 24 x 1" panel with Strings Lines.

### 2.3 METAL SUSPENSION SYSTEMS

- A. Accessories:
  1. #6 x 2 1/2" Painted Head Drill Point Screws.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

**3.2 PREPARATION**

- A. Measure each wall area and establish layout of wall units. Coordinate panel layout with mechanical and electrical fixtures.
- B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

**3.3 INSTALLATION**

- A. Install Tectum® High NRC Direct-Attached Panels in accordance manufacturer's installation instructions.

**3.4 ADJUSTING AND CLEANING**

- A. Replace damaged and broken Tectum® High NRC Direct-Attached Panels.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any Tectum® High NRC Direct-Attached Ceiling Panels that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

**END OF SECTION**

**SECTION 09 84 30 – SLATTED WOOD - SOUND-ABSORBING WALL UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Slatted Wood - Sound-Absorbing Wall Units.
- B. Mounting accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 51 53 - Direct-Applied Acoustical Ceilings.
- B. Section 09 84 33 – Fabric Covered – Sound-Absorbing Wall Units
- C. Section 09 91 23 - Interior Painting.

**1.03 REFERENCE STANDARDS**

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- C. ASTM E795 - Standard Practices for Mounting Test Specimens during Sound Absorption Tests; 2023.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings: Fabrication and installation details.
- D. Verification Samples: Samples of each type of panel specified; 12 by 12 inch, showing construction, edge details, wood species, and finish.
- E. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for acoustical.
- F. Manufacturer's qualification statement.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with at least three years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until units are needed for installation.
- B. Store units flat, in dry, well-ventilated controlled environment between 60°F and 80°F and 30% to 50% RH until the wood has achieved equilibrium; do not stand on end.
- C. Protect edges from damage.

## PART 2 PRODUCTS

### 2.01 SLATTED WOOD SOUND-ABSORBING UNITS

- A. Manufacturers:
  - 1. Terramai; Linear Slat Acoustic Wall Panels.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Wood Acoustical Panels for Walls: Natural, reclaimed wood assembled on Douglas Fir rails and black fiberglass acoustic insulation attached to back between rails.
  - 1. Sound Absorption: Noise Reduction Coefficient (NRC) of 0.70 to 0.80 when tested in accordance with ASTM C423 for Type A mounting, per ASTM E795.
  - 2. Acoustic Back-Up Material: Fiberglass insulation.
    - a. Color: Black.
    - b. Overall Thickness: 1 inch.
  - 3. Panel Size: 12 inches by 96 inches.
  - 4. Panel Thickness: 1 3/4 inch.
  - 5. Panel Weight: 2.6 psf.
  - 6. Wood Species: White Oak.
    - a. Character: Mixed grain with sound, tight, and missing knots, and occasional surface seasoning checks. Missing knots not to exceed 3/4 inch.
    - b. Factory Finish: Zero-VOC clear oil.
  - 7. Slats:
    - a. Size: 1 1/4" wide x 3/4" deep x 95 7/8" long.
    - b. Spacing: 3/4" apart.
  - 8. Rails:
    - a. Species: Douglas Fir stained black with low-VOC stain.
    - b. Size: 1 1/2" wide x 1" deep x 12" long.
    - c. Spacing: 10 1/2" apart
  - 9. Unit Mounting: Use screws to attach panels to steel stud backing in wall.

### 2.02 ACCESSORIES

- A. Trim Moldings: Manufacturer's standard wood moldings for concealing panel edges; match species and finish of the wood slats.
- B. Screws: #8 self-tapping/self-drilling sheet metal screws for attaching rails through drywall into steel stud backing.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.

- B. Install mounting accessories and supports in accordance with shop drawings.
- C. Surface Mounted Wood Slat Panels:
  - 1. For vertical panel layout, attach steel stud backing in wall horizontally.
  - 2. Face screw through cross rails to steel stud backing. 3 screws minimum per rail.
- D. Install acoustical units to construction tolerances of plus or minus 1/16 inch for the following:
  - 1. Plumb and level.
  - 2. Flatness.
  - 3. Width of joints.

**3.03 CLEANING**

- A. Clean sound-absorptive panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

**3.04 PROTECTION**

- A. Provide protection of installed acoustical panels until Date of Substantial Completion.
- B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

**END OF SECTION**



**SECTION 09 84 33 - SOUND-ABSORBING WALL UNITS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes shop-fabricated, fabric-wrapped panel units tested for acoustical performance, including:
  - 1. Sound-absorbing wall panels.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

- A. Product Data: For each type of fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For sound-absorbing wall units. Include mounting devices and details; details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge and core materials.
  - 1. Include elevations showing panel sizes and direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing from sound-absorbing wall unit manufacturer's full range.
  - 1. Show operation of hinged and sliding components covered by or adjacent to sound-absorbing wall units.
- D. Product Certificates: For each type of sound-absorbing wall unit, from manufacturer.
- E. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sound-absorbing wall units to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal recommendations.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Full-size units equal to 5 percent of amount installed, but no fewer than five panels, including Z-clips.

1.7 QUALITY ASSURANCE

- A. Source Limitations: Obtain sound-absorbing wall units from single source from single manufacturer.
- B. Fire-Test-Response Characteristics: Provide sound-absorbing wall units meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 450 or less.
  2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and sound-absorbing wall unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install sound-absorbing wall units until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Air-Quality Limitations: Protect sound-absorbing wall units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- C. Field Measurements: Verify locations of sound-absorbing wall units and actual dimensions of openings and penetrations by field measurements before fabrication.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sound-absorbing wall units that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to the following:
    - a. Acoustical performance.
    - b. Fabric sagging, distorting, or releasing from panel edge.
    - c. Warping of core.

2. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SOUND-ABSORBING WALL UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **GIK Acoustics; Decoshapes Hexagon Acoustic Panels** or comparable product by one of the following:
  1. Acoustical Panel Systems (APS, Inc.).
  2. Conwed Designscape; an Owens Corning company.
  3. Golterman & Sabo.
  4. Lamvin, Inc.
  5. Wall Technology, Inc.; an Owens Corning company.
- B. General Requirements for Sound-Absorbing Wall Units: Units shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Sound-Absorbing Wall Panel: Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
  1. Mounting: Back mounted with manufacturer's standard metal clips or bar hangers, secured to substrate.
  2. Core: glass-fiber board over MDF backing panel.
  3. Edge Construction: Manufacturer's standard wood frame, rabbeted, and splined with glued joints and machined corners.
  4. Edge Profile: Square.
  5. Corner Detail in Elevation: Square with continuous edge profile indicated.
  6. Facing Material: Polyester Fabric.
  7. Acoustical Performance: Sound absorption NRC of not less than 1.05 according to ASTM C 423 for Type A mounting according to ASTM E 795.
  8. Nominal Overall Panel Thickness: As indicated on Drawings.
  9. Panel Width from edge to edge of hexagon: 20 ¾ inches.
  10. Panel Height from point to point of hexagon: 24 inches.
  11. Panel Weight: 24" x 24" x 1" Panel – 3 lbs. 24" x 24" x 2" – 4 lbs.

### 2.2 MATERIALS

- A. Core Materials:
  1. Glass-Fiber Board: ASTM C 612, Type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft., unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
  2. Medium-Density Fiberboard: Panels complying with ANSI A208.2, Grade M-2.
    - a. Made with binder containing no urea formaldehyde.
    - b. Panels shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
    - c. Fire-retardant panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-

spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

3. Wood: Manufacturer's standard clear, vertical grain, straight, kiln-dried hardwood.
  - a. Fire-retardant treated by pressure process with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
    - 1) Treated material shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity.
    - 2) Kiln-dry material after treatment to 7 to 13 percent or less for lumber and 15 percent or less for plywood.
- B. Facing Material: Fabric from same dye lot; color and pattern as selected by Architect from manufacturer's full range.
  1. Manufacturer: Guilford of Maine or approved equal.
  2. Product Line/Pattern: FR701.
  3. Style Number: 2100.
  4. Fiber Content: 100 percent post-consumer recycled polyester.
  5. Width: 66 inches.
- C. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit, and as follows:
  1. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of unit and the other part to substrate, designed to permit unit removal.

## 2.3 FABRICATION

- A. General: Use manufacturer's standard construction except as otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
  1. Square Corners: Tailor corners.
- D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
  1. Thickness.
  2. Edge straightness.
  3. Overall length and width.
  4. Squareness from corner to corner.
  5. Chords, radii, and diameters.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine fabric, fabricated units, substrates, areas, and conditions, for compliance with requirements, installation tolerances, and other conditions affecting performance of sound-absorbing wall units.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. Install sound-absorbing wall units in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with sound-absorbing wall unit manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align and level fabric pattern and grain among adjacent units.

**3.3 INSTALLATION TOLERANCES**

- A. Variation from Plumb and Level: Plus or minus 1/16 inch.
- B. Variation of Panel Joints from Hairline: Not more than 1/16 inch wide.

**3.4 CLEANING**

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

**END OF SECTION 09 84 33**

**SECTION 09 91 00 – PAINTING AND FINISHING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation.
- B. Painting schedules, including painting of exposed surfaces, interior and exterior, except as otherwise specified or indicated.

1.2 RELATED SECTIONS

- A. Section 05 50 00 – Metal Fabrications: Shop Primed Surfaces.
- B. Section 06 20 13 – Exterior Finish Carpentry.
- C. Section 06 20 23 – Interior Finish Carpentry.
- D. Section 07 62 00 – Sheet Metal Flashing and Trim.
- E. Section 08 11 13 – Hollow Metal Doors and Frames.
- F. Section 08 31 13 – Access Doors and Frames.
- G. Section 09 24 00 – Portland Cement Plastering.
- H. Section 09 29 00 – Gypsum Board.
- I. Divisions 21 – 23 – Mechanical Sections as applicable to the Project.
- J. Divisions 25 – 28 – Electrical Sections as applicable to the Project.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual
- C. Referenced Standards:
  - 1. ASTM D523 – Standard Test Method for Specular Gloss.
  - 2. The Master Painters Institute, MPI Gloss and Sheen Levels.

1.4 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with sufficient documented experience.
- B. Applicator: Company specializing in commercial painting and finishing with sufficient documented experience.

- C. Gloss Levels: Per Master Painters Institute (MPI) gloss standards “MPI Gloss and Sheen Levels,” measured in accordance with ASTM D523.

GLOSS LEVEL	DESCRIPTION	GLOSS AT 60 DEGREES ASTM D523	SHEEN AT 85 DEGREES ASTM D523
G1	A traditional matte finish – flat.	5 units, maximum	and 10 units, maximum
G2	A high side sheet flat – “a velvet-like finish.”	10 units, maximum	And 10 – 35 units
G4	A “satin-like” finish	10-25 units	and 35 units maximum
G5	A traditional semi-gloss.	35 - 70 units	-
G6	A traditional gloss.	70 - 85 units	-
G7	A high gloss.	More than 85 units	-

**1.5 REGULATORY REQUIREMENTS**

- A. Conform to California Building Code for flame spread and smoke density requirements for finishes.
- B. Furnish certification that all paint coatings furnished for the location of the project comply with the EPA clean air act for permissible levels of volatile organic content for architectural coatings applied in California as designated by California Air Resources Board (CARB), 2019 California Green Building Standards Code, and the San Joaquin Valley Air Pollution Control District (SJVAPCD).
- C. At the completion of the project, all open containers shall be disposed of by the contractor per State and County Regulations.

**1.6 SUBMITTALS**

- A. Submit product data under provisions of Section 01 33 00.
- B. Provide product data on all finishing products.
- C. Submit four brush-out samples 8 inches by 10 inches in size illustrating color and gloss level selected for each surface finishing product scheduled.
- D. Field Sample: Furnish sample of actual paint colors selected on portion of building item to receive paint as directed by Architect, prior to beginning interior and exterior painting.

**1.7 DELIVERY, STORAGE AND HANDLING**

- A. Deliver products to site in manufacturer's original unopened, labeled containers; inspect to verify acceptance.
- B. Store and protect products from abuse and contamination.
- C. Container labeling is to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation and instructions for mixing and reducing.

- D. Store paint materials at minimum ambient temperature of 50 degrees F and a maximum of 90 degrees F, in well-ventilated area, unless required otherwise by manufacturer's instructions.
- E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

#### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees F for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior work and interior work, unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

#### 1.9 EXTRA STOCK

- A. Provide a new and unopened five-gallon container of each type, color and sheen to Owner.
- B. Label each container with vendor, paint type, color name, and color code, in addition to the manufacturer's label.
- C. Coordinate with the District to transfer the extra stock over to the District.

### PART 2 PRODUCTS

#### 2.1 PAINT SYSTEMS, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

#### 2.2 SUSTAINABLE DESIGN REQUIREMENTS

- A. VOC Content: Provide materials that comply with VOC limits set by Rule 4601 of the San Joaquin Valley Air Pollution Control District and 2019 California Green Building Standards Code Table 5.504.4.3; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
  - 1. Flat Paints and Coatings: VOC content not more than 50 g/L.
  - 2. Primers, Sealers, and Undercoaters: VOC content not more than 100 g/L.
  - 3. Nonflat Paints and Coatings: VOC content not more than 100 g/L.
  - 4. Nonflat-high gloss Paints and Coatings: VOC content not more than 150 g/L.
  - 5. Stains: VOC content not more than 250 g/L.
  - 6. Anti-Corrosive and Anti-Rust Paints and Primers applied directly to Ferrous Metals: VOC content not more than 250 g/L.
  - 7. Zinc-Rich Primer applied to Galvanized and Ferrous Metals: VOC content not more than 340 g/L.



8. Varnish: VOC content not more than 450 g/L.
  - B. Chemical Components of **Field-Applied Interior Paints and Coatings**: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
    1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
    2. Restricted Components: Paints and coatings shall not contain any of the following:
      - a. Acrolein.
      - b. Acrylonitrile.
      - c. Antimony.
      - d. Benzene.
      - e. Butyl benzyl phthalate.
      - f. Cadmium.
      - g. Di (2-ethylhexyl) phthalate.
      - h. Di-n-butyl phthalate.
      - i. Di-n-octyl phthalate.
      - j. 1, 2-dichlorobenzene.
      - k. Diethyl phthalate.
      - l. Dimethyl phthalate.
      - m. Ethylbenzene.
      - n. Formaldehyde.
      - o. Hexavalent chromium.
      - p. Isophorone.
      - q. Lead.
      - r. Mercury.
      - s. Methyl ethyl ketone.
      - t. Methyl isobutyl ketone.
      - u. Methylene chloride.
      - v. Naphthalene.
      - w. Toluene (methylbenzene).
      - x. 1,1,1-trichloroethane.
      - y. Vinyl chloride.
- 2.3 ACCEPTABLE MANUFACTURERS – PAINT
- A. Refer to Table at the end of this Section.
  - B. Substitutions: Under provisions of Section 01 25 13.
- 2.4 ACCEPTABLE MANUFACTURERS – PRIMER SEALERS
- A. Refer to Table at the end of this Section.
  - B. Substitutions: Under provisions of Section 01 25 13.
- 2.5 ACCEPTABLE MANUFACTURERS – STAIN AND CLEAR FINISHES
- A. Refer to Table at the end of this Section.

- B. Substitutions: Under provisions of Section 01 25 13.

## 2.6 MATERIALS

- A. All paint materials shall be provided from a single manufacturer unless noted otherwise in this Section.
- B. Coatings: Ready mixed. Process pigments to a soft paste consistency capable of being readily and uniformly dispersed to a homogeneous coating.
- C. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- D. Accessory Materials: All other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
- E. All Materials specified by brand name or manufacturer shall be delivered unopened at the job in their original containers.

## 2.7 FINISHES

- A. Refer to schedule at end of Section for surface finish schedule.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Storage: All materials used by the painting contractor shall be stored and mixed in a place designated by the Owner or the Architect. The storage place must be kept neat and clean at all times. All cloths, waste or other material that might constitute a fire hazard shall be placed in a suitable metal container or shall be removed from the site or destroyed at the end of each day's work.

### 3.2 INSPECTION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application to the Architect, Architect's representative or inspector in writing. The Architect will cause such defect to be remedied.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Plaster; Gypsum Wallboard: 12 percent.
  - 2. Concrete Masonry Units: 10 percent.
  - 3. Interior Located Wood: 15 percent.
  - 4. Exterior Located Wood: 7 percent.
- D. Beginning of application constitutes acceptance of the surfaces.

### 3.3 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or painting.
- B. Correct minor defects and clean surfaces that affect work of this Section.

- C. Seal marks that may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Gypsum Board Surfaces: Latex fill minor defects. Spot-prime defects after repair.
- F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer, unless otherwise recommended by finish coating system manufacturer.
- G. Shop-Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces as recommended by primer manufacturer. Prime shop-primed steel items with steel primers specified in this Section.
- H. Concrete, Stucco and Masonry: All dust and loose mortar shall be removed by sweeping or by brushing with a stiff fiber or wire brush.
  - 1. Concrete and masonry surfaces that show signs of efflorescent shall be treated with a zinc sulfate wash (3lbs. per gallon of water), or by scrubbing affected areas with a solution of muriatic acid. Remove loose crystals and rinse with clear water. Allow to dry thoroughly before painting.
    - a. All surfaces defects and all cracks more than 1/16 inch wide shall be filled with patching plaster or spackle according to package directions and textured to match adjacent areas.
    - b. Form oils or separating agents that might impair the adhesion or the appearance of the specified finish shall be removed before any materials are applied.
  - 2. Plaster work that has cured for less than two months and all other plaster areas that show the presence of excessive amounts of free alkali when tested with phenolphthalein or some other suitable means shall be treated with a zinc sulfate wash (3 lbs. per gallon of water) to neutralize the alkali and obtain the optimum of surface carbonation.
    - a. All surface Cracks greater than 1/32 inch wide, holes and other surface defects shall be repaired as recommended by the finish paint manufacturer's written instructions.
- I. Interior Wood Items Scheduled to Receive Finish: Hand sandpaper and wipe off dust and grit prior to priming. Seal knots, pitch streaks and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
  - 1. At woodwork with transparent finish, nail holes, cracks or defects shall be filled with wood filler tinted to match color of stain.

### 3.4 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

**3.5 WORKMANSHIP**

- A. All work shall be performed by experienced mechanics in a skillful manner. All materials shall be evenly applied so as to be free from sags, crawls or other defects. Coats shall be of the proper consistency and well brushed out as to show the minimum brush marks, except varnish and enamel which shall be uniformly applied. Brushes shall be clean and in good condition. All areas with a transparent coat will be repainted at contractor's expense.
- B. All painting shall be by brush, except plaster and gypsum board which may be by spraying with back rolling. Underside of soffits, covered walks, acoustical panels and screens may be completed by spraying with back rolling.
- C. No work shall be completed under conditions that are unsuitable for the production of good results. No painting shall be completed while plaster is curing, or while wood sawing, sanding or cleaning is in process. Coats shall be thoroughly dry before the succeeding coat is applied. Finishes shall be uniform as to sheen, shine, color and texture, except when glazing is required.
- D. No exterior painting shall be done in rainy, damp, or frosty weather. No Interior painting or finishing shall be permitted until the building has been thoroughly dried out by artificial heat. A minimum temperature of 50 degrees Fahrenheit shall be maintained in areas where the application or drying of paint is occurring.
- E. This contractor shall take into account that not less than the following percentages of total surfaces shall be painted in deep (dark) tones of color selected: (This includes colors requiring ultra-deep bases)
  - 1. Walls: 25%
  - 2. Ceilings: 25%
  - 3. Doors and Door Frames: 100%
  - 4. Sheet Metal: 50%
  - 5. Exposed Steel: 100%

**3.6 APPLICATION**

- A. Apply products in accordance with manufacturer's instructions.
  - 1. Paint mil thicknesses shall not be less than the minimums recommended by the paint manufacturers.
  - 2. No Paint, varnish or stain shall be reduced or applied in any way except as herein specifically called for, or recommended by the manufacturer.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.

- G. The number of coats called for in the Painting Schedules included in this specification are the minimum number required. Additional coats may be required to achieve the desired finish.
- H. The drawings reference the Painting Schedules included in this specification through the use of a note that references the Paragraph Number of the Schedule and the Painting Paragraph Letter Designation, i.e. **3.9A** references **Painting Schedule - Exterior Surface** and that the surface is **Ferrous Metal**.
- I. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- J. Prime back surfaces of interior and exterior woodwork with primer paint, type as recommended by manufacturer.
- K. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

### 3.7 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. See Divisions 21 – 23 and 25 – 28 for other items requiring painting.
- B. Paint interior surfaces of air ducts and convector heating cabinets that are visible through grilles and louvers with one) coat of flat black paint, to limit of sight line. Paint dampers exposed behind grilles to match face panels. Paint all new interior and exterior exposed ductwork and ductwork supports. Paint all new conduit, pipes and conduit/pipe supports in exposed interior and exterior locations.
- C. Reinstall electrical plates, hardware, light fixture trim, and fittings removed for surface preparation or painting.
- D. Do not paint factory-finished mechanical and electrical equipment.

### 3.8 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed or spattered.
- B. During progress of Work, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove from site daily.

**3.9 PAINTING SCHEDULE – EXTERIOR SURFACES:**

- A. Ferrous Metal
  - 1st coat – Acrylic Low Sheen Primer
  - 2nd and 3rd coats – 100 percent Acrylic Semi-Gloss
  
- B. Ferrous Metal (Industrial)
  - 1st coat – Epoxy Primer
  - 2nd and 3rd coats – Aliphatic Urethane Gloss Enamel
  - For use at exterior metal architectural features/exposed structure
  
- C. Galvanized Metal (Handrail and Guardrail Assemblies only)
  - 1st coat – Etch Prep
  - 2nd coat – Epoxy Satin Primer
  - 3rd and 4th coats – High Dispersion Pure Acrylic Polymer
  
- D. Galvanized Metal and Aluminum (Except Handrail and Guardrail Assemblies)
  - 1st coat – Etch Prep
  - 2nd coat – Acrylic Low Sheen Primer
  - 3rd and 4th coats – 100 percent Acrylic Semi-Gloss
  
- E. Exposed Concrete and Cement Plaster System with Cementitious Finish Coat
  - 1st coat – Acrylic Flat Primer
  - 2nd and 3rd coats – Elastomeric Flat
  
- F. Cement Plaster System with Acrylic Finish Coat
  - 1st coat – Acrylic Flat Primer
  - 2nd and 3rd coats – Elastomeric Flat
  
- G. Wood
  - 1st coat – Acrylic Flat Primer
  - 2nd and 3rd coats – 100 percent Acrylic Flat
  
- H. Wood
  - 1st coat – Acrylic Flat Primer
  - 2nd and 3rd coats – 100 percent Acrylic Semi-Gloss
  
- I. Pressure Treated Wood
  - 1st coat – Acrylic Flat Primer
  - 2nd and 3<sup>rd</sup> coats – 100 percent Acrylic Satin
  
- J. Masonry (CMU)
  - 1st coat – Acrylic Block Filler Primer
  - 2nd and 3<sup>rd</sup> coats – Elastomeric Flat

**3.10 PAINTING SCHEDULE – INTERIOR SURFACES:**

- A. Gypsum Board
  - 1st coat – PVA Primer Sealer
  - Texture by Section 09 29 00 Contractor
  - 2nd coat – PVA Primer Sealer – Tint towards final color.
  - 3rd and 4th coats – 100 percent Acrylic Eggshell
  
- B. Interior Cement Plaster
  - 1st coat – PVA Primer Sealer
  - 2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss Enamel
  
- C. Gypsum Board (Whiteboard Finish)
  - 1<sup>st</sup> coat – PVA Primer Sealer
  - Texture by Section 09 29 00 Contractor (Level 5)
  - 2<sup>nd</sup> coat – Acrylic Flat Primer
  - 3<sup>rd</sup> coat – 2-Part Solvent Based Dry-Erase Coating
  
- D. Wood (Opaque Finish)
  - 1st coat – Acrylic Flat Primer – Tint towards final color.
  - 2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss
  
- E. Interior Ferrous Metal
  - 1st coat – Acrylic Low Sheen Primer – Tint towards final color.
  - 2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss Enamel
  - Typical paint system at all hollow metal doors, pressed metal frames, and exposed steel structure.
  
- F. Concrete
  - 1st coat – Acrylic Flat Primer – Tint towards final color
  - 2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss
  
- G. Masonry (CMU)
  - 1st coat – Acrylic Block Filler Primer
  - 2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss
  
- H. Wood (Transparent Finish)
  - 1st coat – Oil-based Interior Wood Stain
  - 2<sup>nd</sup> coat – Oil-based Interior Sanding Sealer
  - 3<sup>rd</sup> and 4<sup>th</sup> coats – Oil-based Interior Wood Varnish – Semi-Gloss
  
- I. Galvanized Metal, Zinc Alloy Metal and Aluminum
  - 1st coat – Etch Prep
  - 2nd coat – Acrylic Low Sheen Primer – Tint towards final color.
  - 2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss Enamel

PAINTING SCHEDULE

APPLICATION	TYPE	MPI Gloss Level	MANUFACTURER	PRODUCT NUMBER
<b>PRIMERS</b>				
Exterior Ferrous Metal	Acrylic	G2	Vista	8600
Exterior Ferrous Metal (Industrial)	Epoxy	G6	Vista	SET 7900
Exterior Galvanized Metal and Aluminum (Except Handrail and Guardrail Assemblies)	Acrylic	G2	Vista	8600
Exterior Galvanized Metal (Handrail and Guardrail Assemblies Only)	Epoxy	G4	Vista	4800
Exterior Wood and Pressure Treated Wood	Acrylic	G1	Vista	4200
Exterior Cement Plaster and Concrete; and Interior Concrete	Acrylic	G1	Vista	4600
Exterior Cement Plaster System with Acrylic Finish Coat	Acrylic	G1	Vista	4000
Exterior and Interior Masonry (Block Filler)	Acrylic	G1	Vista	40 or 018
Interior Gypsum Board& Cement Plaster	PVA	G1	Vista	1100
Interior Wood	Acrylic	G1	Vista	4200
Interior Ferrous Metal	Acrylic	G2	Vista	8600
Interior Aluminum, Ferrous & Galvanized Metal	Acrylic	G2	Vista	8600
Interior Gypsum Board (Dry-Erase)	Acrylic	G1	Vista	Cover Stain
<b>FINISHES</b>				
Exterior Ferrous & Galvanized Metal, Aluminum, Wood and Pressure Treated Wood (Except Handrail and Guardrail Assemblies)	100 percent Acrylic	G5	Vista	7000
Exterior Ferrous Metal (Industrial)	Aliphatic Urethane Enamel	G6	Rust-oleum	3300
Exterior Galvanized Metal (Handrail and Guardrail Assemblies Only)	High Dispersion Pure Acrylic	G5	Vista	574
Exterior Cement Plaster, Concrete, and CMU	Elastomeric	G1	Vista	500
Exterior Wood and Masonry	100 percent Acrylic	G1	Vista	3000
Exterior Pressure Treated Wood	100 percent Acrylic	G4	Vista	1750
Interior Gypsum Board, Wood, Masonry (CMU) and Concrete	100 percent Acrylic	G5	Vista	7000
Interior Gypsum Board (Dry-Erase Finish)	2-Part Solvent		Rust-oleum	WHITE
Interior Ferrous & Galvanized Metal and Aluminum	100 percent Acrylic Enamel	G5	Vista	8400
Interior Plaster (existing and new)	100 percent Acrylic Enamel	G5	Vista	18400



<b>MISCELLANEOUS</b>				
Interior Wood Stain	Oil-based	G1	Old Masters	11101
Interior Sanding Sealer	Oil-based	G1	Old Masters	45004
Interior Wood Varnish	Oil-based Polyurethane Semi-Gloss Finish	G5	Old Masters	495
Exterior Heavy-Duty Cleaner	Water Based	-	Jasco	Prep & Prime
Exterior & Interior Galvanized Metal Etch Prep.	Water Based	-	Jasco	Prep & Prime

**END OF SECTION**

**SECTION 10 10 00 – MISCELLANEOUS SPECIALTIES**

1. GENERAL:

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division –1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK: (provide and install complete)

A. Section Includes:

1. Projector
2. Projector Mount and Accessories (Ceiling Mount)
4. Portable Assistive Listening System

B. Related Sections:

1. Section 10 14 00 "Signage and Graphics" for Assistive Listening System Sign.

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Data: Provide complete manufacturer's data, including installation instructions and details to contractor's job Superintendent, to facilitate coordination of work.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical data and installation instructions for each material and component part, including data substantiating that materials comply with requirements.
- B. Shop Drawings: Submit for each type of product. Include sections of typical trim members and dimensioned elevations. Show anchors, grounds, reinforcement, and accessories, and installation details.
- C. Certification: Submit manufacturer's certification that all materials furnished for project comply with requirements specified herein.

2. PRODUCTS:

2.1 DIGITAL PROJECTOR:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Epson Brightlink; 760Wi or comparable product by one of the following:
1. Architect and District approved equal.

2.2 PROJECTOR MOUNT AND ACCESSORIES (CEILING MOUNT):

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Chief; SYSAU-Universal Interface Suspended Ceiling Mount Bracket or comparable product by one of the following:
1. Architect and District approved equal.

2.3 PORTABLE ASSISTIVE LISTENING SYSTEM:

- A. Furnish five (5) portable RF (radio frequency) wireless assistive listening systems for use by the hearing-impaired. The assistive listening system (ALS) shall be capable of transmitting on the hearing assistance bandwidth between 72 MHz and 76 MHz. The ALS system shall offer a choice between 17 channels for flexibility and ease of setup. The ALS system shall have 65dB SNR or greater, end-to-end. Receivers shall be frequency agile and frequency set with a "seek" button. The receiver will incorporate a stereo headset jack that allows the user to plug

in either a mono or stereo headset and listen to audio normally. The portable transmitters shall be capable of connecting to the room's sound system by means of 3.5 mm jack. The portable receivers and transmitters shall incorporate automatic battery charging circuitry for recharging of Ni-MH batteries.

- B. Basis of Design Manufacturer: Subject to compliance with requirements, provide portable assistive listening system packages manufactured by Williams AV, LLC or comparable products by one of the following
  - 1. Listen Technologies Corporation
  - 2. Architect and District Approved Equal.
- C. Portable Assistive Listening System:
  - 1. Williams AV, LLC: Personal FM Value Pack System (with earbud), FM Systems PPA VP 37-00 with the following options and accessories:
    - a. PPA T27 Transmitter (Qty: 5 ea.)
    - b. MIC 027 Microphone (Qty: 5 ea.)
    - c. PPA R37 Receivers (Qty: 10 ea.)
    - d. EAR 013 Single Mono Earbud (Qty: 7 ea.)
    - e. NKL 001 Mono Neckloop 18" (for hearing aid and cochlear implants compatibility) (Qty: 5 ea.)
    - f. BAT 026 NiMH rechargeable batteries (pkg. of 2) (Qty: 5 ea.)
    - g. CHG 3512 PRO Body-pack charger, 12 bay with case (Qty: 1 ea.)
    - h. ANT 021 "Rubber Duckie" Antenna (Qty: 2 ea.)
    - i. ADP 010 Audio Adapter (Qty: 5 ea.)
    - j. WCA 013 Audio Cable (Qty: 5 ea.)
    - k. TFP 036 Power Supply (Qty: 5 ea.)

3. EXECUTION

3.1 GENERAL

- A. Field Conditions: Inspect field condition for suitability of proper installation. Inform contractor of conditions requiring attention. Make field measurements as required.

3.2 INSTALLATION

- A. Follow manufacturer's printed installation instructions and as shown on plans.
- B. Provide battery-operated radio-controlled clocks at each space designated on the Electrical Drawings.

3.3 DEMONSTRATION AND TRAINING

- A. Before the date of beneficial occupancy/substantial completion, demonstrate and provide training to SUSD personnel and staff per Section 01 79 00 "Demonstration and Training."

**END OF SECTION 10 10 00**

**SECTION 10 11 00 - VISUAL DISPLAY UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Glass markerboard wall.

**1.02 RELATED REQUIREMENTS**

- A. Section 10 22 39 - Folding Panel Partitions: Installation of visual display boards on operable partitions.

**1.03 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
- C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on glass markerboard, trim, and accessories.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- D. Samples: Two, 2 by 2 inches in size illustrating materials and finish, color and texture of glass markerboard and trim.
- E. Manufacturer's printed installation instructions.
- F. Manufacturer's Qualification Statement.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

**PART 2 PRODUCTS**

**2.01 VISUAL DISPLAY UNITS**

- A. Magnetic Glass Markerboard Wall: Room-size presentation surface made of multiple floor-to-ceiling glass panels.
  - 1. Manufacturers:
    - a. Clarus; Wall2Wall: [www.clarus.com](http://www.clarus.com).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Glass: Back-coated glass, tempered, low iron, 1/4-inch thick, with flat polish and square corners, laminated to steel backing sheet for use with magnets. Coated or treated for use as dry-erase board or projection surface.
  - 3. Glass Finish: White back-coating.
  - 4. Steel Backing Sheet Thickness: 24-gauge, 0.0239 inch.
  - 5. Panel Size (maximum): 72 inches x 144 inches.
  - 6. Height: Full height of wall.

7. Length: Full length of wall.
8. Channel and Trim: Extruded aluminum.
9. Channel: Manufacturer provided L-Channel.
10. Trim: Manufacturer provided T-Trim.
11. Frame Finish: Anodized, natural.
12. Mounting: Anodized aluminum standoffs.
13. Adhesives: Manufacturer's recommended adhesive for substrate indicated on drawings.
14. Glazing Tape: Manufacturer's recommended glazing tape for substrate indicated on drawings.
15. Accessories: Provide magnetic marker tray and magnetic marker holder.

## **2.02 MATERIALS**

- A. Float Glass: Provide float-glass-based glazing unless otherwise indicated.
  1. Fully Tempered Safety Glass: Comply with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

## **2.03 ACCESSORIES**

- A. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.
- B. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.
- C. Mounting Brackets: Concealed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify flat wall surface for frameless adhesive-applied boards.

### **3.02 PREPARATION**

- A. 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 boards in accordance with manufacturer's instructions.
- B. Secure units level and plumb.

### **3.04 CLEANING**

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at Date of Substantial Completion.

**END OF SECTION**

**SECTION 10 14 00 – SIGNAGE AND GRAPHICS**

1. GENERAL:

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division –01 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Accessibility Signs meeting the requirements of Title 24 California Accessibility Standards and the Americans with Disabilities Act. Signs required in this project are as follows and are shown on the drawings:
  - 1. Room Identification Signs
  - 2. Toilet Room Door Symbols
  - 3. Exterior Entrance Sign
  - 4. Assistive Listening System Sign
  - 5. Tactile Exit Signs
  - 6. International Symbol of Accessibility Sign
- B. Parking Lot Accessibility Signs meeting the requirements of Title 24 California Accessibility Standards and the Americans with Disabilities Act. Signs required in this project are as follows and are shown on the drawings:
  - 1. “Tow Away” Sign
  - 2. Accessible Parking Space Sign
  - 3. Van Accessible Parking Space Sign
- C. Room Capacity Signs
- D. Applied Letters and Numbers
- E. Acrylic Wall Mural

1.3 QUALITY ASSURANCE:

- A. Manufacturer’s Data: Provide complete manufacturer’s data, including installation instructions and details to contractor’s job Superintendent, to facilitate coordination of work.
- B. All Signage must be field inspected after installation per CBC 11B-703.1.1.2.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer’s descriptive literature and specifications, including color samples of materials for applicable approval.
- B. Samples: Submit full size sample sign of each type, style, and color specified including method of attachment.
- C. Shop Drawings: Submit shop drawings showing sign styles, compliance with California Title 24 Accessibility Standards (where applicable), lettering, locations, and overall dimensions.
- D. Certification: Submit manufacturer’s certification that all signs furnished for project comply with requirements specified herein.

PRODUCTS:

2.1 ACCESSIBILITY SIGNS:

- A. Signs shall be as shown and detailed on the drawings.
- B. PLAQUE MATERIAL:
  - 1. One piece Melamine plastic laminate with a color contrasting core. Added-on and/or engraved characters are unacceptable.
  - 2. Non-static, fire-retardant, and self-extinguishing.
  - 3. Impervious to most acids, alkalies, alcohol, solvents, abrasives, and boiling water.
- C. RAISED (TACTILE) LETTERS AND NUMBERS:
  - 1. Sans-serif uppercase characters
  - 2. Horizontal format
  - 3. Raised 1/32" from sign plate face
  - 4. 5/8" (min.) to 2" (maximum) high based on the height of the uppercase letter "I".
  - 5. Character proportions shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I".
  - 6. Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the character.
  - 7. Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised characters shall be 1/8 inch minimum and 4 times the raised character stroke width maximum. Where characters have other cross sections, spacing between individual raised characters shall be 1/16 inch minimum and 4 times the raised character stroke width maximum at the base of the cross section, and 1/8 inch minimum and 4 times the raised character stroke width maximum at the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8 inch minimum.
  - 8. Line spacing: Spacing between the baselines of separate lines of raised characters within a message shall be 135 percent minimum and 170 percent maximum of the raised character height.
  - 9. Raised characters shall be duplicated in Braille complying with the following requirements.
- D. CALIFORNIA CONTRACTED GRADE 2 BRAILLE:
  - 1. Domed or rounded shape.
  - 2. Indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns, and names, individual letters or the alphabet, initials, or acronyms.
  - 3. Braille shall be positioned below the corresponding text in a horizontal format, flush left or centered. If text is multi-lined, Braille shall be placed below the entire text. Braille shall be separated 3/8 inch (minimum) and 1/2 inch (maximum) from any other tactile characters and 3/8 inch (minimum) from raised borders and decorative elements.
  - 4. Dot base diameter: 0.059 inches (minimum) to 0.063 inches (maximum).

5. Distance between two dots in the same cell (measured center to center): 0.100 inches.
6. Distance between corresponding dots in adjacent cells (measured center to center): 0.300 inches.
7. Dot height: 0.025 inches (minimum) to 0.037 inches (maximum).
8. Distance between corresponding dots from one cell directly below (measured center to center): 0.395 inches (minimum) to 0.400 inches (maximum).

E. COLOR/FINISH:

1. Color of signs shall match signs already on site and as indicated in the approved drawings.
2. Finish shall be non-glare.

F. DECORATIVE LOGO:

1. Digitally print decorative logo shown on sign details in drawings directly to the surface of the sign with UV Flatbed Direct Print Technology.

2.2 ROOM CAPACITY SIGNS:

- A. Signs shall be 18" wide x 6" high x 1/8" thick
- B. Signs shall have the following characteristics:
  1. Characters shall be raised 1/32" from sign plate face.
  2. Signs shall be of one-piece construction; added-on and/or engraved characters are unacceptable.
  3. Wording for the sign is shown on the drawings.
  4. Sign shall have a 1/2" outside radius at corners
  5. All characters shall contrast with their background – either light characters on a dark background or dark characters on a light background. Characters and background shall have a matte finish.
- C. PLAQUE MATERIAL:
  1. Melamine plastic laminate with a color contrasting core.
  2. Non-static, fire-retardant, and self-extinguishing.
  3. Impervious to most acids, alkalies, alcohol, solvents, abrasives, and boiling water.
- D. LETTERS AND NUMBERS:
  1. Sans-serif uppercase characters
  2. Characters shall be beveled
  3. 1/2" (min.) high
  4. Width-to-height ratio between 3:5 and 1:1
  5. Stroke width-to-height ratio between 1:10 and 1:5
  6. Character spacing shall be 1/8" (min.) to 3/8" (max.) between two adjacent characters measured at top surface.



E. COLOR:

1. Color of signs shall be selected by architect from the manufacturer's standard color palette.

2.3 PARKING LOT ACCESSIBILITY SIGNS:

- A. Signs shall be as shown and detailed on the drawings.
- B. Material: 14 gauge (min.) galvanized steel
- C. Text on sign shall be black capital sans serif letters on white baked enameled background. Size of letters shall be as shown on the drawings.
- D. White reflectorized International Symbol of Accessibility where shown on sign details on drawings shall be 6" high (min.) on a light blue porcelain background. Blue will be equal to Color No. 15090 per Federal Standard 595C.

2.4 APPLIED LETTERS AND NUMBERS:

- A. Manufacturer: Gemini Incorporated  
103 Mensing Way  
Cannon Falls, MN 55009  
(800) 538-8377  
[www.signletters.com](http://www.signletters.com)
- B. Style: Standard Cast Metal Letters
- C. Material: Cast Aluminum.
- D. Size: Shown on Drawings
- E. Exterior Font: Uppercase Helvetica Light
- F. Interior Font: Uppercase Times Bold
- E. Hardware: 3" long metal threaded studs
- F. Text and Location as shown on drawings
- G. Color of letters and numbers shall be selected by architect from the manufacturer's standard color palette.

2.5 ACRYLIC WALL MURAL

- A. Impact-modified Extruded Acrylic: High Density Polyethylene (HDPE); chemical and corrosion resistant with UV inhibitors.
  1. Thickness: ½-inch
  2. Acrylic Color: Clear
  3. Edges: Laser Polished
- B. Die Cut Vinyl Film: High quality 3M, Arion, or Oracle Vinyl for indoor and outdoor use and printed with fade-resistant UV inks.
  1. Die Cut Vinyl Film Color: Selected by Architect from Manufacturer's standard color palate.
- C. Acryl Panel Fabrication: From computerized vector file provided by architect and cleaned up for fabrication purposes, laser cut acrylic to shapes shown on approved drawings. To prevent cracking during shipment and installation, provide a slight radius of 0.05-inch (minimum) on all inside and outside corners.

- D. Vinyl Die-cut Application:
  - 1. Clean and Prepare acrylic to receive vinyl application.
  - 2. Adhere self-adhering colored vinyl to back side of acrylic panels where indicated on the approved drawings.
  - 3. Remove all air bubbles and trim vinyl to edge as required.
- E. Stand-off: C.R. Laurence Co.; 1" dia. x 2" long Standoff System in brushed stainless steel with stainless steel cap, 2 nylon washers, and self-drilling self-tapping ¼-20 x 1 ½" SMS.

3. EXECUTION

3.1 GENERAL

- A. Field Conditions: Inspect field condition for suitability of proper installation. Inform contractor of conditions requiring attention.

3.2 INSTALLATION

- A. Locate sign and mural units where indicated on drawings, using mounting methods of the type described and in compliance with manufacturer's instructions and as indicated on drawings.
- B. Install signs and mural units level, plumb, and at heights indicated on drawings.
- C. Attach and secure signs to walls, doors, poles, fences, or glass with appropriate screws and adhesives or as indicated on drawings.

**END OF SECTION 10 14 00**

**SECTION 10 21 13 - TOILET COMPARTMENTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Solid-polymer toilet compartments configured as toilet enclosures and urinal screens.

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Show locations of cutouts for compartment-mounted toilet accessories.
  - 2. Show locations of centerlines of toilet fixtures.
- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.
- D. Product Certificates: For each type of toilet compartment, from manufacturer.
- E. Independent lab test reports indicating compliance with NFPA 286.
- F. Maintenance Data: For toilet compartments to include in maintenance manuals.

**1.4 QUALITY ASSURANCE**

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 75 or less.
  - 2. Smoke-Developed Index: 450 or less.
- B. HDPE Materials shall be tested in accordance with NFPA 286 and shall comply with the acceptance criteria listed in CCR Title 24 Part 2, California Building Code Section 803.1.2.1.
- C. Regulatory Requirements: Comply with applicable provisions in CCR Title 24, Part 2, California Building Code - Accessibility Standards for toilet compartments designated as accessible.

**1.5 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.
- C. Brass Castings: ASTM B 584.
- D. Brass Extrusions: ASTM B 455.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- F. Stainless-Steel Castings: ASTM A 743/A 743M.
- G. Zamac: ASTM B 86, commercial zinc-alloy die castings.
- H. Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

### 2.2 SOLID-POLYMER UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Scranton Products, Inc.
  - 2. Santana Products, Inc.
  - 3. Comtec Industries.
  - 4. Capitol Partitions.
  - 5. Accutec Manufacturing.
  - 6. Laminating Technologies
  - 7. Global Steel Products Corp.
- B. Toilet-Enclosure Style: Overhead braced.
- C. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
  - 1. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum or stainless-steel strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
  - 2. Side panel of Accessible Toilet Compartment: Provide a toe clearance of 9 inches (12 inches for children use) minimum above finish floor and 6 inches deep beyond the compartment-side face of the partition, exclusive of partition support members. Partition components at toe clearance shall be smooth without sharp edges or abrasive surfaces.
  - 3. Urinal Screen: 55-inch minimum high panel (match height of toilet compartment panels) with bottom no higher than 14 inches from finish floor and top no less than 69 inches from floor.
  - 4. Color and Pattern: TBD by Interior Designer.

5. Texture: Orange Peel

D. Pilaster Shoes: Manufacturer's standard design (modified as required to ensure that height of shoe covers screw heads at low point of floors); stainless steel.

E. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum.

## 2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Manufacturer's standard chrome plated non-ferrous metal, clear anodized aluminum or stainless steel.

2. Hinges: Manufacturer's standard continuous, spring-loaded or gravity type, adjustable to return to a closed position.

3. Slide latch and Keeper: Manufacturer's standard surface-mounted slide latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mounting height between 34 inches and 44 inches above finish floor. Coordinate location with Door Pull.

4. Coat Hook at 48 inches above finish floor: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.

5. Door Pull: Manufacturer's standard U-pull units on both sides of doors between 34 inches and 44 inches above finish floor set immediately below the Slide latch and Keeper.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel with theft-resistant-type heads. Provide stainless steel sex-type bolts for through-bolt applications. All toilet compartment doors shall be through bolted to the hinges and the hinges to the pilasters with stainless steel sex-bolts. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

## 2.4 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments. Doors at side entry accessible stalls shall be in-swinging and shall have 34 inch minimum clear opening width when the door is open 90 degrees.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions as submitted to and approved by Architect. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices and as detailed on the drawings.

1. Maximum Clearances:
  - a. Pilasters and Panels: 1/2 inch.
  - b. Panels and Walls: 1 inch.

- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure as detailed on the drawings. Set units level and plumb, rigid, and secured to resist lateral impact.

### 3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on accessible toilet stall doors to return doors to fully closed position.

**END OF SECTION 10 21 13**

**SECTION 10 26 00 – CORNER AND END WALL GUARDS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Corner and end wall guards.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.
- B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
  - 1. Corner and End-Wall Guards: 12 inches long.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system 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 Architect for review.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures.
    - b. Deterioration of materials beyond normal use.
  - 2. Warranty Period: Lifetime of the Building.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M.
- B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

2.2 CORNER GUARDS

- A. Surface-Mounted, Metal Corner Guards <Insert drawing designation>: Fabricated from one-piece, formed or extruded metal with formed edges; with 90-degree turn to match wall condition.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide IPC Door and Wall Protection Systems: Division of InPro Corporation; Stainless Steel Flush Mount Corner Guard or comparable product by one of the following:
    - a. Alpar Architectural Products, LLC.
    - b. Arden Architectural Specialties, Inc.
    - c. Korogard Wall Protection Systems; a division of RJF International Corporation.
    - d. TheCornerGuardStore.
    - e. WallGuard.com.
  - 2. Material: Stainless steel, Type 304.
    - a. Thickness: Minimum 16 gauge.
    - b. Finish: Directional satin, No. 4.
  - 3. Wing Size: As indicated on approved drawings.
  - 4. Corner Radius: 1/8 inch.
  - 5. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes.

2.3 END-WALL GUARDS

- A. Surface-Mounted, Metal, End-Wall Guards <Insert drawing designation>: Fabricated from one-piece, formed or extruded metal that covers entire end of wall; with formed edges.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide IPC Door and Wall Protection Systems: Division of InPro Corporation; Stainless Steel Flush Mount End Wall or comparable product by one of the following:
    - a. TheCornerGuardStore.
    - b. WallGuard.com.
  - 2. Material: Stainless steel, Type 304.
    - a. Thickness: Minimum 16 gauge.
    - b. Finish: Directional satin, No. 4.
  - 3. Wing Size: Nominal 3 inches. Refer to approved drawings for additional information
  - 4. Corner Radius: 1/8 inch.
  - 5. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes.



2.4 FABRICATION

- A. Fabricate corner and end-wall guards to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

2.5 METAL FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Remove tool and die marks and stretch lines, or blend into finish.
  - 2. Grind and polish surfaces to produce uniform finish, free of cross scratches.
  - 3. Run grain of directional finishes with long dimension of each piece.
  - 4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine walls to which corner and end-wall guards will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install corner and end-wall guards level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

**END OF SECTION 10 26 00**

**SECTION 10 26 10 - WALL PROTECTION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Protective wall covering.

**1.02 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate physical dimensions and features.
- C. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
  - 1. Submit two samples of protective wall covering, 8 by 8 inches square.
- D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention, and substrate requirements.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Stock Materials: 40 square feet of each kind of protective wall covering.
- G. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.
- B. Protect work from moisture damage.
- C. Protect work from UV light damage.
- D. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item. A minimum roof temperature of 40°F and a maximum of 100°F should be maintained.
- E. Store products in flat horizontal position, in compliance with manufacturer's instructions.

**1.05 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide limited lifetime manufacturer warranty for Wall Protection projects. Contractor shall include all recommended components and accessories (primer, adhesive, caulk/sealant, trims and moldings) related to the manufacturer's wall protection products. Complete forms in Owner's name and register with manufacturer.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Protective Wall Covering:
  - 1. Construction Specialties, Inc; Acrovyn by Design Metallics: [www.c-sgroup.com](http://www.c-sgroup.com).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 PRODUCT TYPES**

- A. Protective Wall Covering:
  - 1. Thickness: 0.040 inch.
  - 2. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
  - 3. Color: Blanco #18174, Solid.
  - 4. Accessories: Provide manufacturer's standard color-matched trim and moldings for vertical, wainscot, inside corners, and outside corners.
    - a. Length: 10 feet
    - b. Visible Trim Width: 3/8 inch
    - c. Ability to accommodate 0.040-inch thickness.
  - 5. Mounting: Adhesive.
    - a. Provide manufacturer's standard and required adhesive for lifetime warranty.
  - 6. Primer: Provide manufacturer's standard and required adhesive for lifetime warranty.
  - 7. Caulk: Construction Specialties, Inc.; ColorFlex II bacteria resistant caulk.

### **2.03 FABRICATION**

- A. Fabricate components with tight joints, corners and seams.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper and timely completion.
  - 1. Do not proceed until unsatisfactory conditions have been corrected.
- B. Start of installation constitutes acceptance of project conditions.

### **3.02 PREPARATION**

- A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris, and loose particles. Perform additional preparation procedures as required by manufacturer's instructions. Minimum Level 3 wall finish is required. For surfaces with Level 5 finish, ensure the surface and any surface coatings are fully dry and cured.
- B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

### **3.03 INSTALLATION**

- A. Install the work of this section in strict accordance with the manufacturer's recommendations using approved adhesive. Note there are special installation instructions for non-standard conditions: radius walls, tile, CMU block, etc.

1. Full-Height Installation: Establish a plumb line located at edge of starting point of first sheet to ensure following sheets will be installed plumb.
  2. Apply adhesive with 1/8 inch V-notch trowel to an area of wall surface that can be completed within cure time of the adhesive.
  3. Install trim pieces as required for a complete installation. Allow tolerance for thermal movement.
  4. At joints indicated to be caulked, allow for a minimum 1/16 inch wide gap between edges of sheets. Gaps are required to be of consistent width throughout the project.
  5. Use a roller to ensure maximum contact with adhesive.
  6. At inside and outside corners cut covering sheets to facilitate installation of trim pieces or corner guards.
- B. Temperature at the time of installation must be between 65-75°F and be maintained for at least 48 hours after the installation to allow for proper adhesive set-up.
- C. Relative humidity shall not exceed 80%.
- D. Do not expose wall covering to direct sunlight during or after installation. This will cause the surface temperature to rise, which in turn will cause bubbles and delamination.

#### **3.04 CLEANING**

- A. General: Immediately upon completion of installation, clean material in accordance with manufacturer's recommended cleaning method.
- B. Remove surplus materials, rubbish, and debris resulting from installation as work progresses and upon completion of work.

#### **3.05 PROTECTION**

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

**END OF SECTION**

**SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Public-use washroom accessories.
  - 2. Hand dryers.
  - 3. Underlavatory guards.
  - 4. Custodial accessories.

1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Include electrical characteristics.
- B. Samples: For each exposed product and for each finish specified, full size.
  - 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify locations using room designations indicated on approved drawings.
  - 2. Identify accessories using designations indicated on approved drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

- A. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: **Seven** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE 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. Structural Performance: Design accessories and fasteners to comply with the following requirements:
  - 1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
  - 2. Shower Seats: Installed units are able to resist 360 lbf applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Grab Bar (Accessible Toilet (36" long)):
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI; 3801** or comparable product by one of the following:
    - a. Bobrick
    - b. Architect and District approved equal.
  - 2. Mounting: Flanges with concealed fasteners.
  - 3. Material: Stainless steel, 18 gauge thick.
    - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
  - 4. Outside Diameter: 1-1/2 inches.
  - 5. Configuration and Length: Straight, 36 inches long.
- B. Grab Bar (Accessible Toilet Room or Stall (48" long)):
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI; 3801** or comparable product by one of the following:
    - a. Bobrick
    - b. Architect and District approved equal.
  - 2. Mounting: Flanges with concealed fasteners.
  - 3. Material: Stainless steel, 18 gauge thick.
    - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
  - 4. Outside Diameter: 1-1/2 inches.
  - 5. Configuration and Length: Straight, 48 inches long.

- C. NOT USED
- D. Toilet Tissue (Roll) Dispenser (Public & Staff Toilet Stalls):
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; B-2888** or comparable product by one of the following:
    - a. Architect and District approved equal.
  - 2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
  - 3. Mounting: Surface Mounted.
  - 4. Operation: Noncontrol delivery with theft-resistant spindle.
  - 5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
  - 6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- E. Seat-Cover Dispenser:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; B-4221** or comparable product by one of the following:
    - a. Architect and District approved equal.
  - 2. Mounting: Surface Mounted
  - 3. Minimum Capacity: two sleeves of 250 half-fold seat covers.
  - 4. Exposed Material and Finish: Stainless Steel w/ Satin Finish.
- F. Soap Dispenser:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **GOJO®; FMX-20** or comparable product by one of the following:
    - a. Architect and District approved equal.
  - 2. Description: Designed for manual operation and dispensing soap in foam form.
  - 3. Mounting: Vertically oriented, surface mounted.
  - 4. Capacity: 2000 mL.
  - 5. Materials: Durable ABS Plastic with rugged polycarbonate view windows.
  - 6. Lockset: Tumbler type.
  - 7. Refill Indicator: Window type.
- G. NOT USED
- H. Coat Hook:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; B-6727** or comparable product by one of the following:
    - a. Architect and District approved equal.
  - 2. Description: Double Robe/ Coat Hook
  - 3. Mounting: Surface Mounted
  - 4. Exposed Material and Finish: Stainless Steel w/ Satin Finish.
- I. NOT USED

- J. Combination Paper Towel (Roll) Dispenser and Waste Receptacle:
1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; 3974** or comparable product by one of the following:
    - a. Architect and District approved equal.
  2. Description: Automatic universal roll paper towel dispenser w/ intuitive LED light.
  3. Mounting: Recessed.
  4. Minimum Capacity: up to 8-inch- wide, 800-foot- long roll.
  5. Minimum Waste Receptacle Capacity: 12 gal.
  6. Material and Finish: Stainless Steel w/ Satin Finish.
  7. Lockset: Tumbler type for towel dispenser compartment and waste receptacle.
  8. Power: Provide A/C power unit
- K. High-Speed Air Dryer:
1. Basis-of-Design Product: Subject to compliance with requirements, provide **Excel Dryer Inc.; Xlerator XL-SB w/ ADA-Compliant Recess Kit and HEPA Filtration System** or comparable product by one of the following:
    - a. Architect and District approved equal.
  2. Description: High-speed, warm-air hand dryer for rapid hand drying.
  3. Mounting: Semi-recessed.
    - a. Protrusion Limit: Installed unit protrudes maximum 4 inches from wall surface.
  4. Operation: Infrared-sensor activated with timed power cut-off switch.
    - a. Average Dry Time: 8 seconds.
    - b. Automatic Shut Off: At 35 seconds.
  5. Sound Level: Adjustable 65-75 dB.
  6. Heat Range: Adjustable 72°F - 135°F
  7. Cover Material and Finish Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  8. Electrical Requirements: 110 to 120 V, 11.3 to 12.2 A, 1240 to 1450 W or 208 to 277 V, 5.6 to 6.2 A, 1160 to 1490 W.
- L. Sanitary-Napkin Disposal Unit:
1. Surface Mounted:
    - a. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; B-270** or comparable product by one of the following:
      - 1) Architect and District approved equal.
    - b. Mounting: Surface mounted.
    - c. Door or Cover: Hinged Cover and Hinged Bottom (for easy removal of filled liner).
    - d. Receptacle: Fixed.
    - e. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  2. Sanitary Napkin/ Tampon Vending Dispenser:
    - a. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; B-4706** or comparable product by one of the following:
      - 1) Architect and District approved equal.



- b. Mounting: Recessed.
- c. Door or Cover: Hinged face panel with tumbler lockset.
- d. Description: Push-Button Operation, less than 5 lbs. force, no grasping, pinching or twisting of the wrist. Holds 30 tampons, 20 napkins.
- e. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

M. Mirror Units:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick; B-1658** or comparable product by one of the following:
  - a. Architect and District approved equal.
2. Material: Stainless steel, 20 gauge thick.
  - a. Finish: Smooth, ASTM A480/A480M No. 8 finish (mirror).
3. Size: **(M1)** 24" wide x 36" high. **(M2)** 18" x 36"
4. Hangers: Manufacturer's standard rigid.

2.3 UNDERLAVATORY GUARDS

A. Underlavatory Guard:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Truebro, an IPS Corporation; Lav Guard® 2E-Z** or comparable product by one of the following:
  - a. Architect and District approved equal.
2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded vinyl, white.

2.4 CUSTODIAL ACCESSORIES

A. Custodial Mop and Broom Holder (**W2**):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **ASI; 1315-4** or comparable product by one of the following:
  - a. Architect and District approved equal.
2. Description: **Unit with shelf, hooks, holders, and rod suspended beneath shelf.**
3. Length: **36 inches.**
4. Hooks: Three.
5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  - a. Shelf: Not less than nominal 18-gauge thick stainless steel.
  - b. Rod: Approximately 3/8" diameter stainless steel.

2.5 MATERIALS

- A. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

2.6 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 and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of **six** keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions and per approved details, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
  - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements and per approved details.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces according to manufacturer's written instructions.

**END OF SECTION 10 28 00**

**SECTION 10 44 13 - FIRE EXTINGUISHER CABINETS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Fire extinguisher cabinets for the following:
    - a. Portable fire extinguishers.
- B. Related Sections:
  - 1. Section 10 44 16 "Fire Extinguishers."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
  - 1. Fire Extinguisher Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Maintenance Data: For fire extinguisher cabinets to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate size of fire extinguisher cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire extinguisher cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B.
- B. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 FIRE EXTINGUISHER CABINET

- A. Cabinet Type: Suitable for fire extinguisher.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. J. L. Industries, Inc., a division of Activar Construction Products Group; Ambassador Series.
  - b. Larsen's Manufacturing Company; Architectural Series.
  - c. Potter Roemer LLC; 1700 Series.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Steel sheet.
  1. Shelf: Same metal and finish as cabinet.
- D. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
  1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- E. Cabinet Trim Material: Steel sheet.
- F. Door Material: Steel sheet.
- G. Door Style: Fully glazed panel with frame.
- H. Door Glazing: Acrylic sheet.
  1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
  1. Provide projecting lever handle with cam-action latch.
  2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- J. Accessories:
  1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
  2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
  3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
    - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
      - 1) Location: Applied to cabinet glazing.
      - 2) Application Process: Pressure-sensitive vinyl letters.
      - 3) Lettering Color: Red.

4) Orientation: Vertical.

K. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:
  - a. Exterior of cabinet, door, and trim except for those surfaces indicated to receive another finish.
  - b. Interior of cabinet and door.

## 2.3 FABRICATION

- A. Fire Extinguisher Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
  1. Weld joints and grind smooth.
  2. Provide factory-drilled mounting holes.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
  1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
  2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

## 2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire extinguisher cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire extinguisher cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.5 STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
  1. Color and Gloss: As selected by Architect from manufacturer's full range.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Prepare recesses for semi-recessed fire extinguisher cabinets as required by type and size of cabinet and trim style.

**3.3 INSTALLATION**

- A. General: Install fire extinguisher cabinets in locations and at mounting heights indicated.
- B. Fire Extinguisher Cabinets: Fasten cabinets to structure, square and plumb.
  - 1. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
- C. Identification: Apply vinyl lettering at locations indicated.

**3.4 ADJUSTING AND CLEANING**

- A. Remove temporary protective coverings and strippable films, if any, as fire extinguisher cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire extinguisher cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire extinguisher cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire extinguisher cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire extinguisher cabinet and mounting bracket manufacturers.
- E. Replace fire extinguisher cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION 10 44 13**

**SECTION 10 44 16 - FIRE EXTINGUISHERS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Sections:
  - 1. Section 10 44 13 "Fire Extinguisher Cabinets."

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function.
- C. Warranty: Sample of special warranty.
- D. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

**1.4 QUALITY ASSURANCE**

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

**1.5 COORDINATION**

- A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

**1.6 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure of hydrostatic test according to NFPA 10.
    - b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
    - b. Larsen's Manufacturing Company.
    - c. Potter Roemer LLC.
  2. Valves: Manufacturer's standard.
  3. Handles and Levers: Manufacturer's standard.
  4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 3-A:40-B:C, 5-lb with monoammonium phosphate-based dry chemical in enameled-steel container. **See floor plans for locations.**

### 2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
    - b. Larsen's Manufacturing Company.
    - c. Potter Roemer LLC.
  - B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
    1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
      - a. Orientation: Vertical.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.



1. Remove and replace damaged, defective, or undercharged fire extinguishers.
  - B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 INSTALLATION
- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
    1. Mounting Brackets: 48 inches above finished floor to top of fire extinguisher handle.
  - B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated per details shown on drawings.

**END OF SECTION 10 44 16**

## **SECTION 11 52 13 - PROJECTION SCREENS**

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Electrically operated, ceiling recessed, front-projection screens.
  - 2. Front Projection screen controls.

#### 1.3 RELATED SECTIONS

- A. Division 5 - Metal Fabrications: Suspension systems for projection screens
- B. Section 06 40 00 - Interior Architectural Woodwork: Wood trim for recessed screen installation.
- C. Section 09 29 00 – Gypsum Board: Ceiling for recessed screen installation
- D. Section 09 51 13 – Acoustical Panel Ceiling: Supports and trim for suspended ceilings.

#### 1.4 REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.
- C. GREENGUARD Gold®.
- D. US Green Building Council.

#### 1.5 DEFINITIONS

- A. Gain: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.
- B. Half-Gain Angle: The angle, measured from the axis of the screen surface to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

#### 1.6 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- B. Wiring diagram for electrically operated units.
- C. Shop Drawings: Show layouts and types of front-projection screens. Include the following:

1. Location of screen centerline.
2. Location of wiring connections.
3. Seams in viewing surfaces.
4. Detailed drawings for concealed mounting.
5. Connections to suspension systems.
6. Anchorage details.
7. Accessories.

- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For front-projection screens to include in maintenance manuals.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Environmental Limitations: Do not deliver or install front-projection screens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

#### 1.9 COORDINATION

- A. Coordinate layout and installation of front-projection screens with adjacent construction, including ceiling suspension systems, light fixtures, HVAC equipment, fire-suppression system, and partitions.

#### 1.10 WARRANTY

- A. Manufacturer limited warranty: 5 years from date of purchase.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Single Source Limitations for Projection Screens: Obtain each type of projection screen required from a single manufacturer as a complete unit, including necessary mounting hardware and accessories.

#### 2.2 MOTORIZED, CEILING RECESSED, FRONT PROJECTION SCREENS\*\* NOTE TO SPECIFIER:\*\* Maximum image width up to 16 feet (488 cm) wide, depending on surface selection.

- A. Access V: Electric motor operated, steel case. Ceiling-recessed, 18-gauge steel headbox, 7-3/8 inches high x 8-1/16 inches deep (188 mm high x 205 mm deep), including trim flanges with white paint finish and stamped 13-gauge steel end caps. UL approved "Suitable for use in environmental air space." Bottom closure panel forms slot for passage of viewing surface and can be released to hang down or be removed for access to operating mechanism and viewing surface. Bottom perimeter flange provides support and trim for acoustical ceiling panels and trim for gypsum board ceiling. Access case may be ordered in advance and the screen installed later to eliminate field damage. Screen installs in minutes. Housing is symmetrical allowing for

left (standard) and right (optional) hand motor locations and for viewing surface to unroll off front or back of roller. Steel mounting brackets slide in extruded aluminum mounting system along top of case. Brackets supporting roller/fabric assembly slide in tracks inside top of the case, allowing viewing surface to be centered in case. Steel leveling brackets are attached to case to prevent deflection. Housing designed with internal junction box and plug-in wiring connections to allow housing to be installed and connected to building power supply separately from motor and viewing surface.

1. Motor mounted inside screen roller on rubber isolation insulators. Motor UL certified, rated 110-120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches.
2. Quiet Motor mounted inside screen roller on rubber isolation insulators. Motor operates at 44db and is UL certified, rated 110-120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches.
3. Motor shall be left mounted (standard).
4. Motor shall be right mounted (optional).
5. Projection Viewing Surface:
  - a. Matt White XT1000VB - On Axis gain of 1.0. 180 degree viewing cone. GREENGUARD Gold certified. Black backing. 4K ready.
  - b. TecVision XT1000X White - On Axis gain of 1.0. 180 degree viewing cone. Imaging Science Foundation certified. 8K ready reference screen surface for blending applications and Ultra-Short Throw (UST) projection. Precise resolution and color accuracy. Dark backing.
  - c. TecVision CS1100X ALR - On Axis gain of 1.1. Rejects 82% of off-axis ambient light. 40 degree viewing cone. Provides excellent contrast and color reproduction. Performs well in ambient light. Imaging Science Foundation certified. 8K ready. Dark backing.
6. Tab-Tensioning System:
  - a. Viewing surface with integrated tabs and cable on each side of fabric to provide tension and ensure flat viewing surface. Viewing surface and tabs CNC cut as a single piece. Tabs RF welded to the back of viewing surface to prevent tab separation. Tab adhesives are not acceptable. Viewing surface inserted into aluminum bottom dowel.
7. Viewing Area H x W.
  - a. HDTV Format (16:9). Black masking borders standard.
    - 1) 161 inch (4089 mm) diagonal, 80 inches x 140 inches (2032 mm x 3556 mm).
    - 2) 184 inch (4674 mm) diagonal, 90 inches x 160 inches (2286 mm x 4064 mm).
8. Provide an extra screen drop with an overall screen drop of \_\_\_ inches (\_\_\_ mm) with top border matching viewing surface color.
9. Provide an extra screen drop with an overall screen drop of \_\_\_ inches (\_\_\_ mm) with a black masking top border.

## 2.3 FRONT PROJECTION SCREEN CONTROLS

- A. General: All controls are UL Certified
  1. Single station control rated 115V AC, 60 Hz with 3-position rocker switch with cover plate to stop or reverse screen at any point.

2. Multiple station control rated 115V AC, 60 Hz with 3-position rocker switches with cover plates to stop or reverse screen at any point. Automatic override allows only one signal to reach the motor when operated simultaneously.
3. Low voltage control unit with three button 24V switches and cover plate to stop or reverse screen at any point, built-in RF receiver, built-in Video Interface Control trigger for 3V-28V, RS232, and dry contact relays.
4. Low voltage 24V control unit with hand held RF remote three button control switch to stop or reverse screen at any point, built-in RF receiver, built-in Video Interface Control trigger for 3V-28V, RS232, and dry contact relays.
5. Low voltage 24V control unit with hand held IR remote three button control switch to stop or reverse screen at any point, built-in RF receiver, built-in Video Interface Control trigger for 3V-28V, RS232, and dry contact relays.
6. Key Operated power supply switch to control power to control system.
7. Locking switch cover plate for limited access to three position switch.
8. Key operated 3-position control switch rated 115V AC, 60 Hz to stop or reverse screen at any point.
9. 3-position low voltage control switch with key locking cover plate rated 24V to stop or reverse screen at any point.
10. LVC-IP Bridge. Acts as an IP to Serial Gateway for controlling Draper lifts & screens when used in conjunction with an LVC-IV. Configuration is done using built-in buttons and display.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify rough-in openings are properly prepared.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

#### 3.3 INSTALLATION

- A. Install front-projection screens at locations indicated to comply with screen manufacturer's written instructions.
- B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.
- C. Test electrically operated units to verify screen, controls, limit switches, closure and other operating components are in optimum functioning condition.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion

END OF SECTION 11 52 13

**SECTION 14 21 00 – ELECTRIC TRACTION ELEVATORS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes electric traction elevators.
- B. Products Supplied but Not Installed Under this Section:
1. Hoist Beam
  2. Pit Ladder
  3. Inserts mounted in block walls for rail attachments
- C. Work Supplied Under Other Sections:
1. Temporary lighting, including temporary lighting in hoistway for machine space with switch located in hoistway on the strike jamb side of top landing door.
  2. Main line disconnects for each elevator.
    - a. One fused three phase permanent power in building electrical distribution room.
  3. Hoistway ventilation shall be in accordance with local and national building code requirements.
  4. Guide Rail Support shall be structurally adequate to extend from pit floor to top of hoistway, with spans in accordance with requirements of authority having jurisdiction and final layouts.
  5. Removable barricades at all hoistway openings, in compliance with OSHA 29 CFR 1926.502 in addition to any local code requirements.
  6. Lifeline attachments capable of withstanding 5000 lb load in accordance with OSHA 29 CFR 1926.502. Provide a minimum of 2 at the top, front of each hoistway.
  7. Pit lighting: Fixture with switch and guards. Provide illumination level equal to or greater than that required by ASME A17.1/CSA B44 2000, or applicable version.
  8. Control space lighting with switch. Coordinate switch with lighting for machine space as allowable by code.
- D. Related Requirements:
1. Section 01 50 00 – “Temporary Facility and Controls”
  2. Section 03 30 00 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.

3. Section 05 12 00 "Structural Steel Framing" for the following:
  - a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
  - b. Structural-steel shapes for subsills that are part of steel frame.
4. Section 05 50 00 "Metal Fabrications" for the following:
  - a. Attachment plates and angle brackets for supporting guide-rail brackets.
  - b. Structural-steel shapes for subsills.
  - c. Pit ladders.
  - d. Cants in hoistways made from steel sheet.
5. Section 07 16 00 "Below Grade Waterproofing"
6. Section 09 65 19 "Resilient Tile Flooring" for finish flooring in elevator cars.
7. Section 23 00 00 "Heating Ventilating and Air Conditioning"
8. Section 26 00 00 "Electrical"
9. Section 27 15 00 "Communications Horizontal Cabling" for telephone service for elevators.
10. Section 28 31 10 "Fire Alarm, Integrated Safety System" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.

### 1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

### 1.4 INDUSTRY AND GOVERNMENT STANDARDS

- A. ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities
- B. ADAAG - Accessibility Guidelines for Buildings and Facilities
- C. ANSI/NFPA 70, National Electrical Code

### 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature for each proposed system.
  1. Cab design, dimensions and layout.
  2. Layout, finishes, accessories and available options.
  3. Controls, signals and operating system.
  4. Color selection charts for cab and entrances.
- B. Shop Drawings:
  1. Clearances and travel of car.
  2. Clear inside hoistway and pit dimensions.
  3. Location and layout of equipment and signals.
  4. Car, guide rails, buffers and other components in hoistway.
  5. Maximum rail bracket spacing.
  6. Maximum loads imposed on building structure.
  7. Hoist beam requirements.
  8. Location and sizes of access doors.
  9. Location and details of hoistway door and frames.



- 10. Electrical characteristics and connection requirements.
  - C. Samples for Initial Selection: For finishes involving color selection.
  - D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch- square Samples of sheet materials; and 4-inch lengths of running trim members.
  - E. Qualification Data: For Installer.
  - F. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.
    - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
    - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
  - G. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
  - H. Sample Warranty: For special warranty.
- 1.6 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
    - 1. In addition to items specified in the General Conditions, Article 3, Parts 3.17 and 3.18, include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
  - B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
  - C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner with terms, conditions, and obligations as set forth in, and in same form as, "Draft of Elevator Maintenance Agreement" at end of this Section, starting on date initial maintenance service is concluded.
  - D. Diagnostic Tools
    - 1. Prior to seeking final acceptance for the completed project as specified by the Contract Documents, the Elevator Contractor shall deliver to the Owner any specialized tool(s) that may be required to perform diagnostic evaluations, adjustments, and/or parametric software changes and/or test and inspections on any piece of control or monitoring equipment installed.

This shall include any specialized tool(s) required for monitoring, inspection and/or maintenance where the means of suspension other than conventional wire ropes are furnished and installed by the Elevator Contractor. Any and all such tool(s) shall become property of the Owner. Any diagnostic tool provided to the Owner by the Elevator Contractor shall be configured to perform all levels of diagnostics, systems adjustment

and parametric software changes which are available to the Elevator Contractor.

In those cases where diagnostic tools provided to the Owner require periodic recalibration/or re-initiation, the Elevator Contractor shall perform such tasks at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the completed project. During those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation, or repair, the Elevator Contractor shall provide a temporary replacement for the tool at no additional cost to the Owner.

The Elevator Contractor shall deliver to the Owner, printed instructions for the proper use of any tool that may be necessary to perform diagnostic evaluations, system adjustment, and/or parametric software changes on any unit of microprocessor-based elevator control equipment and means of suspension other than standard elevator steel cables furnished and install by the Elevator Contractor.

Accompanying the printed instructions shall be any and all access codes, password, or other proprietary information that is necessary to interface with the microprocessor-control equipment.

#### 1.7 QUALITY ASSURANCE

- A. Manufacturer: Minimum of fifteen years' experience in the fabrication, installation and service of elevators of the type and performance of the specified. The manufacturer shall have a documented quality assurance program.
- B. Installer: The equipment manufacturer shall install the elevator.
- C. Inspection and Testing: In accordance with requirements of local jurisdiction, obtain required permits, inspections and tests.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. If the construction site is not prepared to receive the elevator equipment at the agreed ship date, the General Contractor shall be responsible for the cost of storage at an approved facility. Additional labor costs for double handling will be the responsibility of the General Contractor.
- B. Delivered elevator materials shall be stored in a protected environment in accordance with manufacturer recommendations. A minimum storage area of 10 feet by 20 feet is required adjacent to the hoistway.

#### 1.9 COORDINATION

- A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work relating to elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

#### 1.10 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Warranty Period: One year from date of Substantial Completion.

#### 1.11 MAINTENANCE SERVICE

- A. The elevator manufacturer shall provide maintenance service consisting of regular examinations and adjustments of the elevator equipment for a period of 12 Months after date of final acceptance.

Predictive maintenance shall be included for the full maintenance period. This service must be capable of using AI-based analytics to identify potential equipment issues and notifying the elevator provider via an internet connection.

Replacement parts shall be produced by the original equipment manufacturer.

- B. Maintenance service to be performed during regular working hours of regular working days and shall include emergency call back service during regular working hours.
- C. Maintenance service shall not include adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Kone, Inc.; KONE Machine Room-Less traction elevator - Monospace 700DX** or comparable product by one of the following:
1. Otis Elevator Company.
  2. ThyssenKrupp Elevator.
- B. Source Limitations: Obtain elevators from single manufacturer.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Car Performance
1. Car Speed  $\pm$  5% of contract speed under any loading condition or direction of travel.
  2. Car Capacity: Safely lower, stop and hold (per code) up to 125% of rated load.
- B. System Performance
1. Vertical Vibration (maximum): ISO 18738/ISO 8041 system pk-pk 15-17 mg
  2. Horizontal Vibration (maximum): ISO 18738/ISO 8041 system pk-pk 10-12 mg
  3. Jerk Rate (maximum): 3.3 ft/sec<sup>3</sup>
  4. Acceleration (maximum): 1.3 ft/sec<sup>2</sup>
  5. In Car Noise: 55 dB(A) Maximum
  6. Leveling Accuracy:  $\pm$ 0.2 inches
  7. Starts per hour (maximum): 240

## 2.3 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturers' standard components shall be used, as included in standard elevator systems and as required for complete system.
- B. Elevator Description:
1. Elevator Equipment: KONE Machine Room-Less gearless traction elevator
  2. Equipment Control: KCM831
  3. Drive: Regenerative
  4. Quantity of Elevators: 1 Elevator
  5. Landings: 4
  6. Openings: 4 Front Openings, 0 Back Openings
  7. Travel: 39' 0"
  8. Rated Capacity: 5,000 lb AIA
  9. Rated Speed: 200 FPM
  10. Clear Inside Dimensions: (W x D) 5' 8 1/2" x 9' 0 "
  11. Cab Height: 9'
  12. Clear height under suspended ceiling: 8'-4"
  13. Entrance Width and Type: 54" and Left Opening
  14. Entrance Height: 8'-0"
  15. Main Power Supply: 480 V Volts + 5%, three-phase
  16. Operation: Simplex
  17. Machine Location: Inside the hoistway mounted on car guide rail
  18. Control Space Location: Remote room
  19. Elevator Equipment shall conform to the requirements of seismic zone: Seismic
  20. Maintenance Service Period: 12 Months

## 2.4 EQUIPMENT: CONTROL COMPONENTS AND CONTROL SPACE

- A. Controller: Provide microcomputer-based control system to perform all functions.
1. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
  2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed and physically segregated from the rest of the controller.
  3. Provide a serial cardrack and main CPU board containing a non-erasable EPROM and operating system firmware.
  4. Variable field parameters and adjustments shall be contained in a non-volatile memory module.
- B. Drive: Provide Variable Voltage Variable Frequency AC drive system to develop high starting torque with low starting current.
- C. Controller Location: Locate controller{s} in the front wall integrated with the top landing entrance frame, machine side of the elevator. One non-fused three phase permanent power in hoist way at top landing. A separate control space should not be required.

## 2.5 EQUIPMENT: HOISTWAY COMPONENTS

- A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway.

- B. Hoisting: Elevator must utilize traditional steel hoist cables that do not require a monitoring device.
- C. Governor: Friction type over-speed governor rated for the duty of the elevator specified.
- D. Buffers, Car and Counterweight: Polyurethane buffer.
- E. Hoistway Operating Devices:
  - 1. Emergency stop switch in the pit
  - 2. Terminal stopping switches.
  - 3. Emergency stop switch on the machine
- F. Positioning System: System consisting of magnets and proximity switches.
- G. Guide Rails and Attachments: Steel rails with brackets and fasteners.

## 2.6 EQUIPMENT: HOISTWAY ENTRANCES

- A. Hoistway Entrances
  - 1. Sills: Extruded Nickel Silver.
  - 2. Doors: Hollow metal construction with vertical internal channel reinforcements.
  - 3. Fire Rating: Entrance and doors shall be UL fire-rated for 1-1/2 hour.
  - 4. Entrance Finish: Brushed Stainless Steel.
  - 5. Entrance Markings Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

## 2.7 EQUIPMENT: CAR COMPONENTS

- A. Car Frame: Provide car frame with adequate bracing to support the platform and car enclosure.
- B. Car Safeties: Device will be provided and mounted under the car platform, securely bolted to the Car Frame. The safety will be actuated by a centrifugal governor mounted at the top of the hoistway. The Safety is designed to operate in case the car attains excessive descending speed.
- C. Platform: Platform shall be all steel construction.
- D. Car Guides: Provide guide-shoes mounted to top and bottom of both car and counterweight frame. Each guide-shoe assembly shall be arranged to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.
- E. Car Wall Finish:
  - 1. Side Walls: Scottish Quad Textured Stainless Steel (K)
  - 2. Rear Wall: Scottish Quad Textured Stainless Steel (K)
  - 3. Car front, Door and Skirting: Brushed Stainless Steel
  - 4. Ceiling: Large, uniform, LED light panel
  - 5. Handrails: Brushed Stainless Steel
    - a. Rails to be located on Side Walls of car enclosure.
  - 6. Sills: Nickel Silver extruded.
- F. Cab Wall Protection Pads to be included
- G. Flooring: By others. (Not to exceed 6lb/sqft and 1/2" finished depth.)
- H. Emergency Car Signals

1. Emergency Siren: Siren mounted on top of cab that is activated when the alarm button in the car operating panel is engaged. Siren shall have rated sound pressure level of 80 dB(A) at a distance of three feet from device. Siren shall respond with a delay of not more than one second after activation of alarm button.
2. Emergency Car Lighting: Provide emergency power unit employing a 12- volt sealed rechargeable battery and totally static circuits shall illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
3. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

I. Ventilation: Manufacturer's standard cab fan

## 2.8 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

A. Car Operating Panel: Provide car operating panel with all push buttons, key switches, and message indicators for elevator operation. Fixture finish to be Brushed Stainless Steel

1. Main Flush mounted car operating panel shall contain a bank of round, mechanical, illuminated buttons marked to correspond to landings served, emergency call button, door open button, door close button, and key switches for lights, inspection, and exhaust fan. Buttons have White Dot Matrix illumination (halo). All buttons to have raised text and Braille marking on left hand side. The car operating display panel shall be White Dot Matrix. All texts, when illuminated, shall be White Dot Matrix. The car operating panel shall have a Brushed Stainless Steel finish.
2. Additional features of car operating panel shall include:
  - a. Car Position Indicator within operating panel Brushed Stainless Steel
  - b. Elevator Data Plate marked with elevator capacity and car number on car top.
  - c. Help buttons with raised markings.
  - d. In car stop switch per local code.
  - e. Call Cancel Button.

B. Hall Fixtures: Wall mounted hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Wall mounted hall fixtures shall have a Brushed Stainless Steel finish.

1. Hall fixtures shall feature round, mechanical, buttons in applied mount face frame. Hall fixtures shall correspond to options available from that landing. Buttons shall be in a vertically mounted fixture.

C. Hall Lanterns and Chime: A directional lantern visible from the corridor shall be provided at each hall entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel, and a chime will sound. The chime will sound once for up and twice for down. The hall lantern face plate shall have a Brushed Stainless Steel finish.

## 2.9 EQUIPMENT: ELEVATOR OPERATION AND CONTROLLER

A. Elevator Operation

1. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
2. Zoned Car Parking.
3. Relative System Response Dispatching.

B. Standard Operating Features to include:

1. Full Collective Operation
2. Fan and Light Control.
3. Load Weighing Bypass.
4. Ascending Car Uncontrolled Movement Protection

5. Top of Car Inspection Station.
- C. Additional Operating Features to include:
1. Car Wall Protection Pads
  2. Provision for Card Reader in Car (Card Reader provided and Installed by others).
  3. Offline Color Screen
  4. Emergency Battery Power Supply
    - a. When the main line power is lost for longer than 5 seconds the emergency battery power supply provides power automatically to the elevator controller. The elevator will rise or lower to the first available landing, open the doors, and shut down. The elevator will return to service upon the return of normal main line power. An auxiliary contact on the main line disconnect and shunt trip breaker (if required) shall be provided by others.
- D. Elevator Control System for Inspections and Emergency
1. Provide devices within controller to run the elevator in inspection operation.
  2. Provide devices on car top to run the elevator in inspection operation.
  3. Provide within controller an emergency stop switch to disconnect power from the brake and prevents motor from running.
  4. Provide the means from the controller to mechanically lift and control the elevator brake to safely bring car to nearest available landing when power is interrupted.
  5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
  6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
  7. Provide the means for the control to reset elevator earthquake operation.
- 2.10 EQUIPMENT: DOOR OPERATOR AND CONTROL
- A. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.
- B. The door operator shall be arranged so that, in case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Emergency devices and keys for opening doors from the landing shall be provided as required by local code.
- C. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. A door open button shall be provided in the car. Momentary pressing of this button shall reopen the doors and reset the time interval.
- D. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.
- E. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors

shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Prior to start of work, verify hoistway is in accordance with shop drawings. Dimensional tolerance of hoistway from shop drawings: -0 inches +2 inches. Do not begin work of this section until dimensions are within tolerances.
- E. Prior to start of work, verify projections greater than two inches (four inches if ASME A17.1/CSA B44 2000 applies) must be beveled not less than 75 degrees from horizontal.
- F. Prior to start of work, verify landings have been prepared for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.
- G. Prior to start of work, verify elevator pit has been constructed in accordance with requirements, is dry and reinforced to sustain vertical forces, as indicated in approved submittal. Verify that sumps or sump pumps located within pit will not interfere with installed elevator equipment.
- H. Prior to start of work, verify control space has been constructed in accordance with requirements, with access coordinated with elevator shop drawings, including sleeves and penetrations.
- I. Verify installation of GFCI protected 20-amp in pit and adjacent to each signal control cabinet in control space.

#### **3.2 PREPARATION**

- A. Coordinate installation of anchors, bearing plates, brackets and other related accessories.

#### **3.3 INSTALLATION**

- A. Install equipment, guides, controls, car and accessories in accordance with manufacturer installation methods and recommended practices.
- B. Properly locate guide rails and related supports at locations in accordance with manufacturer's recommendations and approved shop drawings. Anchor to building structure using isolation system to minimize transmission of vibration to structure.
- C. All hoistway frames shall be securely fastened to fixing angles mounted in the hoistway. Coordinate installation of sills and frames with other trades.
- D. Lubricate operating system components in accordance with manufacturer recommendations.
- E. Perform final adjustments, and necessary service prior to final acceptance.



**3.4 CONSTRUCTION**

- A. Interface with Other Work:
  - 1. Guide rail brackets attached to steel shall be installed prior to application of fireproofing.
  - 2. Coordinate construction of entrance walls with installation of door frames and sills. Maintain front wall opening until elevator equipment has been installed.
  - 3. Ensure adequate support for entrance attachment points at all landings.
  - 4. Coordinate wall openings for hall push buttons, signal fixtures and sleeves. Each elevator requires sleeves within the hoistway wall.
  - 5. Coordinate emergency power transfer switch and power change pending signals as required for termination at the primary elevator signal control cabinet in each group.
  - 6. Coordinate interface of elevators and fire alarm system.
  - 7. Coordinate interface of dedicated telephone line.

**3.5 FIELD QUALITY CONTROL**

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.
- C. Obtain required permits and provide originals to Owner's Representative.

**3.6 PROTECTION**

- A. Temporary Use: Comply with the following requirements for elevator used for construction purposes:
  - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
  - 2. Provide strippable protective film on entrance and car doors and frames.
  - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
  - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
  - 5. Do not load elevators beyond their rated weight capacity.
  - 6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
  - 7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

**3.7 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).
- B. Check operation of elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

- C. Prior to final acceptance, instruct Owner's Representative on the proper function and required daily maintenance of elevators. Instruct personnel on emergency procedures.

**3.8 MAINTENANCE**

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 1. Perform maintenance during normal working hours.
  - 2. Perform emergency callback service during normal working hours with response time of two hours or less.

**END OF SECTION 14 24 00**

**SECTION 21 13 13 – WET-PIPE SPRINKLER SYSTEMS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Pipes, fittings, and joining methods
  - 2. Fire-protection valves
  - 3. Trim and drain valves
  - 4. Specialty valves
  - 5. Fire-department connections
  - 6. Specialty fittings
  - 7. Sprinklers
  - 8. Alarm devices

**1.2 SYSTEM DESCRIPTIONS**

- A. NFPA 13 System: System designed and installed in accordance with NFPA 13 as amended by the California Building Code and the California Fire Code as listed on the cover sheet of the project documents.
- B. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply. Water discharges immediately from sprinklers when they are opened.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- B. Sprinkler system(s) design shall be approved by authorities having jurisdiction.
  - 1. Margin of safety for available water flow and pressure shall be 10 percent, including losses through water-serving piping, fittings, valves, and backflow preventers.
  - 2. Sprinkler Occupancy Hazard Classifications:
    - a. Residential, Office and Public Areas: Light Hazard.
    - b. Utility Areas: Ordinary Hazard, Group 1
    - c. Storage Areas: Ordinary Hazard, Group 2
  - 3. Minimum Density for Automatic-Sprinkler Piping Design:
    - a. Light Hazard Occupancy: 0.10 GPM per sq. ft.
    - b. Ordinary Hazard, Group 1 Occupancy: 0.15 GPM per sq. ft.
    - c. Ordinary Hazard, Group 2 Occupancy: 0.20 GPM per sq. ft.
  - 4. Maximum Protection Area per Sprinkler: Per UL listing.
  - 5. Total Combined Hose-Stream Demand Requirement: According to NFPA 13.
- C. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13.

**1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details.

1. Wiring Diagrams: For power, signal, and control wiring.
- C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations.
- D. Welding certificates.
- E. "Contractor's Material and Test Certificate for Aboveground Piping."
- F. "Contractor's Material and Test Certificate for Underground Piping."
- G. Operation and maintenance data.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
  1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test conducted within twelve months.
    - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports.
- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
  1. NFPA 13, "Installation of Sprinkler Systems."
  2. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

### 2.2 PIPE AND FITTINGS

- A. Standard Weight (schedule 40) and Light Weight (schedule 10), Black-Steel Pipe: ANSI/ASTM F442, Type E, Grade A or B; or ASTM A135; or ASTM A795. Pipe ends may be factory or field-formed to match joining method.
- B. CPVC Pipe: ANSI/ASTM F442, UL listed for fire protection service Pipe ends may be factory or field-formed to match joining method.
- C. CPVC Pipe fittings: ANSI/ASTM F437, UL listed for fire protection service
- D. Black-Steel Pipe Nipples: ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends per ANSI 1.20.1 (B2.1).
- E. Malleable-Iron Threaded Fittings: ANSI B16.3, made of ASTM A536 malleable iron, with threaded ends per ANSI 1.20.1 (B2.1).
- F. Cast-Iron Threaded Fittings: ANSI B16.4, made of ASTM A126 cast iron, with threaded ends per ANSI 1.20.1 (B2.1).
- G. Cast-Iron Flanges: ANSI B16.4, made of ASTM A126 cast iron, Class 125.
- H. Steel Welding Fittings: ASTM A53, Type E, Grade A or B; or ASTM A135; or ASTM A795.

I. Grooved-Joint, Steel-Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Victaulic Company
  - b. Tyco Fire Suppression and Building Products
  - c. Anvil International
2. Pressure Rating: 175 psig minimum.
3. Grooved-End Fittings for Steel Piping: ASTM A 536, ductile-iron casing; with dimensions matching steel pipe.
4. Grooved-End-Pipe Couplings for Steel Piping: Rigid pattern, unless otherwise indicated, for steel-pipe dimensions. ASTM A 536, ductile-iron housing, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic and asbestos free.
  1. Class 125, Cast-Iron Flat-Face Flanges: Full-face gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
  1. Valves shall be UL listed.
  2. Minimum Pressure Rating: 175 psig.
- B. Backflow preventer: Double check type, Ames or equal.
- C. Indicating Valves:
  1. Body material: Cast or ductile iron.
  2. End connections: Flanged or grooved
- D. Check Valves: Victaulic, or equal.
  1. Type: Swing check.
  2. Body material: Cast or ductile iron.
  3. End connections: Flanged or grooved.

2.5 TRIM AND DRAIN VALVES

- A. Angle, check and globe trim valves for fire sprinkler service: NIBCO, United Brass, or equal.

2.6 SPECIALTY VALVES

2.7 FIRE DEPARTMENT CONNECTIONS

2.8 SPECIALTY FITTINGS

2.9 SPRINKLERS

PRODUCT DATA SHEET 1 - S.

- A. Sprinkler heads shall glass bulb.

- B. Sprinkler heads shall be color coded.
- C. Sprinkler heads in areas with exposed piping shall be standard upright or pendant type. Sprinklers in finished ceilings to be chrome with white escutcheons. T-bar ceiling to receive semi-recessed sprinklers. Ceiling with surface mounted lights are allowed to be pendant with 401 style 2 piece escutcheons.
- D. Sprinkler heads in corrosive environments (i.e., all chemical rooms) shall have a white coating applied at the factory. Sprinkler heads in all other areas allowed to have a standard finishes.

#### 2.10 ALARM DEVICES

- A. Water flow indicator for local alarm: UL approved suitable for variable pressure, complete with instantaneous recycling retard and electrical contacts for alarm system (number as required). Potter Electric Signal, or equal.

### PART 3 - EXECUTION

#### 3.1 WATER-SUPPLY CONNECTIONS

#### 3.2 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
  - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- C. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.
- I. Install sprinkler control valves, test assemblies, and drains.
- J. Install alarm devices in piping systems.
- K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- L. Install pressure gages on riser.
- M. Install sleeves for exposed piping penetrations of walls, ceilings, and floors.
- N. Install sleeve seals for piping penetrations of concrete walls and slabs.
- O. Install escutcheons for piping penetrations of walls, ceilings, and floors.

#### 3.3 JOINT CONSTRUCTION

#### 3.4 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

### 3.5 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

### 3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
  - 3. Coordinate with fire-alarm tests. Operate as required.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

### 3.7 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

**END OF SECTION 21 13 13**

**SECTION 22 05 10 - PLUMBING GENERAL PROVISIONS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. References.
- B. Description of Work.
- C. Drawings and Specifications.
- D. Industry Standards and Codes.
- E. Site Examination.
- F. Permits, Fees and Utility Connections.
- G. Coordination of Work.
- H. Progress of Work.
- I. Submittals
- J. Operation and Maintenance Manuals.
- K. Project Record Documents.
- L. Warranty.
- M. Quality and Care
- N. Access Doors.

**1.2 RELATED SECTIONS**

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
- B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the plumbing systems.
- C. The requirements of this Section apply to all Work of Division 22.
- D. Section 01 30 00 – Administrative Requirements
- E. Section 01 40 00 - Quality Requirements.
- F. Section 01 70 00 – Execution and Closeout Requirements
- G. Section 01 78 00 – Closeout Submittals
- H. Section 01 79 00 – Demonstration and Training.

**1.3 REFERENCES**

- A. ANSI - American National Standards Institute.
- B. ASTM - American Society for Testing Materials.
- C. CEC - California Electric Code.
- D. NEMA - National Electric Manufacturers' Association.
- E. NFPA - National Fire Protection Association.
- F. OSHA - Occupational Safety and Health Act.
- G. UL - Underwriters' Laboratories.
- H. See detailed References that are listed in individual sections.

**1.4 DESCRIPTION OF WORK**

- A. The work included in this division of the specifications consists of furnishing labor, tools, equipment, supplies and materials, unless otherwise specified, and in performing operations necessary for the installation of the complete Plumbing System as required by these



specifications or shown on the Drawings, subject to the terms and conditions of the Contract Agreement.

- B. The work shall also include the completion of details of plumbing work not mentioned or shown which are necessary for the successful operation of plumbing systems described on the drawings or required by these specifications. Furnish and install any incidental work not shown or specified which is required to provide a complete and operational system.

#### 1.5 DRAWINGS AND SPECIFICATIONS

- A. Drawings are schematic and diagrammatic. Drawings indicate the general arrangement of equipment, piping, and other plumbing work. Use judgement and care to install plumbing work to fit the job conditions within the building construction and finishes, and to function properly.
- B. The Contractor shall investigate the building conditions affecting the Work and shall arrange his work accordingly providing offsets, fittings, valves and accessories to fit the actual job conditions. The Contractor shall be responsible to field measure and confirm new and existing plumbing systems locations with respect to other architectural, structural, mechanical and electrical work, existing and new. Do not scale distances off of the plumbing drawings. Use actual building dimensions.
- C. The drawings and specifications are complimentary each to the other. What is required by one shall be as binding as if called for by both.
- D. Examine all drawings and specifications prior to bidding the Work. Report any discrepancies to the Engineer.

#### 1.6 INDUSTRY STANDARDS AND CODES

- A. The Plumbing Contractor shall comply with the latest provisions of all codes, regulations, laws and ordinances applicable to the work involved. This does not relieve the Contractor from furnishing and installing work shown or specified which may exceed the requirements of such codes, regulations laws and ordinances.
- B. All materials, products, devices, fixtures forms or types of construction included in this project shall meet or exceed the published requirements of the publications listed below. These publications form a part of this specification.
  - 1. California Building Code, 2022.
  - 2. California Mechanical Code, 2022.
  - 3. California Plumbing Code, 2022.
  - 4. California Electrical Code, 2022.
  - 5. National Fire Protection Association.
  - 6. California Fire Code, 2022.
  - 7. California State Fire Marshal.
  - 8. Occupational Safety and Health Administration, including CAL-OSHA.
  - 9. State of California Energy Conservation Standards.
  - 10. State of California Code of Regulations, Title 24.
  - 11. Other applicable state laws.
- C. Nothing in the Drawings or Specifications shall be construed to permit work that does not conform these codes. When Contract Documents differ from governing codes, furnish and install to the higher standard required at no extra charge. The Contract Documents are not intended to repeat the code requirements except where necessary for clarity.
- D. No material or product installed as a part of the Work shall contain asbestos in any form.

#### 1.7 SITE EXAMINATION

- A. Contractor shall examine the site, verify dimensions and locations with Drawings, check utility connection locations, and familiarize himself with the existing conditions and limitations. No extras will be allowed because of the Contractor's misunderstanding of the amount of work involved or his lack of knowledge of any site condition which may affect his work. Any apparent variance of the drawings or specifications from the existing conditions at the site shall be called to the attention of the Engineer immediately.

**1.8 PERMITS, FEES AND UTILITY SERVICES**

- A. Contractor shall pay for and obtain all permits and service required in the installation of this work.
- B. Contractor shall arrange for all required inspections and will secure approvals from authorities having jurisdiction.

**1.9 COORDINATION OF WORK**

- A. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the plumbing work, and in its interface with other work and that such establishment is the exclusive responsibility of the contractor.
- B. The Contractor shall give careful consideration to the work of the General, Mechanical, Electrical and other contractors on the job and shall organize his work so that it will not interfere with the work of other trades. He shall consult the drawings and specifications for work of other trades for correcting information, and the pertinent drawings for details and dimensions.
- C. Arrange plumbing work in a neat, well-organized manner with the piping and similar services running parallel and/or perpendicular to primary lines of the building construction. Locate operating and control equipment properly to provide easy access, and arrange entire plumbing work with adequate access for operation and maintenance.
- D. Verify the location of all equipment, air distribution devices, etc. and if interference develops, the Owner/Engineer's decision will be final and no additional compensation will be allowed for the moving of misplaced air devices or equipment.

**1.10 PROGRESS OF WORK**

- A. The Contractor shall organize his work so that the progress of the plumbing work will conform to the progress of the other trades, and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from defective or ill-timed work performed under this section shall be borne by this Contractor.

**1.11 STRUCTURAL DESIGN REQUIREMENTS AND SEISMIC RESTRAINTS**

- A. Plumbing systems and equipment shall be anchored and, as applicable, seismically braced in accordance with all applicable codes and industry standards.
- B. Where seismic bracing is required, Contractor shall be responsible for the design of seismic bracing for all plumbing equipment and systems to comply with the 2022 California Building Code (CBC) and the latest edition of the Mason Industries "Seismic Restraint Guidelines".
  - 1. Contractor shall submit details and calculations prepared and signed by a licensed professional structural engineer registered in the state in which the Work is performed demonstrating compliance with the above and all applicable codes.
  - 2. Drawings, details and calculations shall be submitted to the project Structural Engineer for review. Compliance documents shall be approved by the Engineer prior to installation.
- C. Plumbing systems and equipment shall include, but are not limited to, all domestic water, domestic waste & vent, natural gas, & all other distribution systems & components installed by the plumbing contractor according to the scope on the plumbing drawing sheets.
- D. Supports, anchorage and restraints for all piping for standard installation details that comply with the latest edition of the latest edition of the Mason Industries "Seismic Restraint Guidelines", or equal, shall be used wherever possible. The Contractor shall provide all supporting documentation required for the Engineer and the reviewing authorities. If compliance with one of these standards is demonstrated, separate structural calculations are not required.
- E. For all non-standard installations not detailed in one of the approved systems, the Contractor shall provide details of supports, anchorages and restraints with supporting calculations all stamped and signed by a licensed professional structural engineer registered in the state in which the Work is performed.

### 1.12 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements, for additional submittal procedures.
- B. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
  - 1. Submit within 15 days after date of Notice to Proceed.
  - 2. For products specified only by reference standards, list applicable reference standards.
- C. 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.
- D. Shop Drawing Submittals: Prepared specifically for this Project.
- E. Organize submittals in sequence according to Specification Section. Submit in bound document with tabs identifying each Specification Section. Provide a Table of Contents identifying the Specifications Sections being submitted and the contents within each tabbed section. Prepare Submittals in multiple volumes if required. Provide a complete Submittal package at one time. Do not submit individual Sections piecemeal.
- 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.
- G. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- H. Furnish, upon request, installation instructions for all equipment and materials to Inspector of Record prior to installation.
- I. Maintain a copy of the fire and smoke damper installation instructions on site for use by the Inspector of Record.

### 1.13 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Architect will consider requests for substitutions only within 7 days after date of Agreement.
- C. Substitutions will not be considered when a product becomes unavailable through no fault of the Contractor.
- D. Failure by the Contractor to order materials or equipment in a timely manner will not constitute justification for a substitution.
- E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- F. A request for substitution constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse Owner and Architect for review or redesign services associated with reapproval by authorities including obtaining reapproval by authorities.
- G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

- H. If excessive review, as judged by the Engineer, is required caused by complicated, numerous or repetitive requests, Contractor shall reimburse Engineer and its Consultants for such review at their standard billing rates.
- I. Substitution Submittal Procedure:
  - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
  - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  - 3. The Architect will notify Contractor in writing of decision to accept or reject request.
  - 4. Present each substitution individually. If a proposed substitute is not found to be acceptable, then the specified item shall be supplied.

#### 1.14 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01 78 00 - Closeout Submittals for Operation and Maintenance Manual requirements.
- B. Provide operating and maintenance instructions, diagrams and parts lists for all components of all plumbing systems and each piece of equipment furnished under these specifications.
- C. Operating and maintenance instructions shall be furnished for the following equipment and systems:
  - 1. Plumbing Systems.
  - 2. Piping Systems.
  - 3. Motors.
  - 4. Water Balance and Test Reports.
- D. Provide manufacturer's model number, design data, capacities, etc. for each piece of plumbing equipment furnished as a part of the Work.
- E. The operating instructions shall include procedures for starting, stopping and emergency manual operation for all equipment and systems.
- F. Provide maintenance instructions of each item of individual equipment including applicable maintenance data as recommended by the manufacturer, including frequency of lubrication, lubricants, inspections required, adjustment procedures, belt and pulley sizes, etc.
- G. Provide manufacturer's parts bulletins with part numbers for each item of equipment included in the Work. Parts bulletins shall be specific to the equipment provided. Extraneous information that does not apply to the equipment provided shall be eliminated from the literature.
- H. Include copies of test reports (startup, check, etc.) and inspections performed for each piece of equipment provided in the Work.
- I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- J. Provide supplier and manufacturer contacts, telephone numbers and addresses in the front portion of the operation and maintenance manual.

#### 1.15 PROJECT RECORD DOCUMENTS

- A. See Section 01 78 00 - Closeout Submittals for Project Record Document requirements.
- B. Record (As built) Drawings:
  - 1. Supplementing the requirements of the General Conditions and Supplementary General Conditions, As-Built Drawings shall show invert elevations of sanitary sewers, rain water leaders and storm sewers of critical locations, locations of shut-off valves and stub-outs for future, and all changes made during the course of the work. Furnish reproducible drawings when work is complete.
  - 2. The grade or quality of materials desired is indicated by the trade names or catalog numbers stated herein
  - 3. Dimensions, sizes, and capacities shown are a minimum and shall not be changed without permission of the Architect.

1.16 QUALITY ASSURANCE

- 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, 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.

1.17 WARRANTY

- A. See Section 01 78 00 – Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a one-year period after Date of Substantial Completion.

**PART 2 PRODUCTS**

2.1 QUALITY AND CARE

- A. All materials shall be new and in perfect condition when installed unless specifically indicated otherwise. Materials shall be tested within the Continental United States by an independent, nationally recognized testing agency and shall be listed in accordance with testing agency requirements. When not otherwise specified, all material shall conform to applicable National Standards (ANSI).
- B. All capacities, sizes and efficiency ratings shown on the drawing are minimum. Gas meter and gas pressure reducing valve capacities are maximum allowable.
- C. Each category of material or equipment shall be of the same brand or manufacturer throughout the Work wherever possible.
- D. The quality of materials and equipment to be provided is defined by the brand names, manufacturers, model and catalog numbers listed on the Drawings and in the Specifications. Contractor shall provide each item listed, of the quality specified, or equal.
- E. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in applicable Installation and Maintenance Manuals.
- F. Inspect and report concealed damage to carrier within their required time period.
- G. Store materials in a clean, dry space. Maintain factory protection and/or provide an additional heavy canvas or heavy plastic cover to protect from dirt, water, construction debris, and traffic.
- H. Equipment which has been damaged, exposed to weather or is, in the opinion of the Engineer or Owner, otherwise unsuitable because of improper fabrication, storage or installation shall be removed and replaced by this Contractor at his expense.

2.2 ACCESS DOORS

- A. Coordinate access door requirements with Section 08 31 13. The more stringent requirements shall govern.
- B. Provide access doors where access through floors, walls or ceilings is required to access plumbing, plumbing, control system components, fire dampers and fire alarm system components (such as smoke detectors, fire/smoke dampers, etc.) or other systems requiring access for maintenance, test or observation.
  - 1. Access doors requiring hand access or access for observation only shall be 14"x14" minimum usable opening.

2. Ceiling access panels to be minimum 24x24 (or required and approved size).
3. Access doors where entrance of a service person may be required shall be 24"x30" minimum usable opening.
- C. Established standard: Milcor of types listed below. Other acceptable manufacturers: Karp, Elmdor, In-Ryko, Acudor, or approved equal. Comply with the following:
  1. Form doors and frames of welded, ground smooth steel construction, 14 gauge for doors, 16 gauge for frames. Provide prime coat finish except for stainless steel type.
  2. Concealed hinges to allow 175 degree opening.
  3. Locks: flush, screw driver operated cam lock(s). Provide two keys for each set of locks provided.
  4. Provide anchoring devices suitable for the construction into which the doors are framed.
- D. Application (as applicable):
  1. In gypsum drywall walls and ceilings: Type DW.
  2. In ceramic tile walls: Type MS (stainless steel).
  3. In fire rated walls: Type Fire Rated (rating as required for wall or ceiling), self closing, 250 F in 30 min. temperature rating.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION**

- A. Access Doors
  1. Coordinate the exact location of access doors to provide proper access to the item concealed. Obtain written approval for access door locations from Architect.
  2. Coordinate installation of access doors with the trades performing the construction assemblies into which the access doors are placed.
  3. Install all access doors neatly and securely, to open and close completely, and to operate freely and without binding. Install rated doors in accordance with their listing requirements.
  4. Test operate all doors and make all adjustments required for satisfactory operation. Replace all damaged materials.
  5. Install in accordance with manufacturer's instructions.

#### **3.2 OWNER-FURNISHED EQUIPMENT**

- A. Some equipment is to be furnished under another Contract and is indicated as such on Drawings. Rough-in for such equipment, receive, uncrate, install and connect plumbing equipment, faucets, and fixtures as furnished by others. Furnish and install stops, traps, strainers, backflow preventers, valves and other appurtenances not furnished by others in order to provide a complete operating system.
- B. Comply with paragraph on Plumbing Fixtures Installation, this Section, for installation procedures.
- C. Refer to plumbing fixture connection schedule on Drawings.

#### **3.3 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with the requirements within this section.
- B. Test all piping with no leak or loss in pressure in accordance with the requirements within this section.

#### **3.4 TESTING AND INSPECTION**

- A. See individual specification sections for additional testing and inspection required.
- B. Testing Agency Duties:
  1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  2. Perform specified sampling and testing of products in accordance with specified standards.
  3. Ascertain compliance of materials and mixes with requirements of Contract Documents.

4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
  5. Perform additional tests and inspections required by Architect.
  6. Submit reports of all tests/inspections specified.
- C. 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.
- D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used which 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.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.
- 3.5 GENERAL TESTING REQUIREMENTS FOR PLUMBING SYSTEMS
- A. Contractor shall assign a responsible person to be an independent representative to witness testing and to sign as witness of times, pressure and losses of testing media for all plumbing and gas piping testing.
1. Test all piping as noted below with no leak or loss of pressure. Repair or replace defective piping until tests are accomplished successfully.
  2. Submit to the Engineer for review a log of all tests made which shall include time, temperature, pressure, water makeup and other applicable readings, necessary to indicate the systems have been operated and tested in the manner outlined in the construction documents.
  3. After producing the specified test pressure, disconnect the pressurizing source; do not introduce further pressure for the duration of the test period, repair leaky piping and retest. Repeat the procedure until the entire system is proven tight.
- B. Testing:
1. General:
    - a. Provide temporary equipment for testing, including pumps, compressors, tanks, and gauges, as required. Test piping systems before insulation (if any) is installed and remove or disengage control devices before testing. Where necessary, test sections of each piping system independently, but do not use piping valves to isolate sections where test pressures exceed local valve operating pressure rating. Fill each section with water, compressed air, or nitrogen and pressurize for the indicated pressure and time.
    - b. Notify Architect and local Plumbing Inspector two days before tests.

- c. Drainage, Waste and Vent Piping: Test in accordance with governing plumbing code or as follows: Test drainage and venting systems, with necessary openings plugged, to permit system to be filled with water and subjected to a water pressure of a minimum of 5 PSI head. System to hold water without a water level drop greater than 1/2 pipe diameter of largest nominal pipe size within a 24-hour period. Test system in sections if minimum head cannot be maintained in each section. The 5 PSI head to be the minimum pressure at the highest joint.
- d. Water Piping: Eliminate air from system. Fill and test at 125 PSIG or minimum 1-1/2 times static pressure at connection to serving utility main for a period of two hours with no loss in pressure.
- e. Send test results to Architect for review and approval.
2. Testing of Pressurized Systems:
  - a. Test each pressurized piping system at 150 percent of operating pressure indicated, but not less than 125 PSIG test pressure.
  - b. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 2 percent of test pressure.
  - c. Test hot and cold domestic water piping systems upon completion of rough-in and before connection to fixtures at a hydrostatic pressure of 125 PSIG.
3. Gas Piping:
  - a. Cap openings and test with compressed air or nitrogen. Systems to maintain test pressure for a period of 24 hours with no leaks or pressure loss.
  - b. Test Pressure: 100 PSIG. Use only nontoxic soap and water or commercially approved leak detector liquids for leak detection. Testing mediums and apparatus required to be oil free.
  - c. Energize and test equipment connected to piping for proper operation. Test "final" gas piping and fittings installed on equipment beyond the rough in piping for leakage using an electronic ionization gas detector. Submit a certificate indicating the completion of the prescribed testing procedure and that such equipment and piping is free from leakage. Test pressures not to exceed recommendations or instructions by manufacturers of equipment and devices.
4. Repair:
  - a. Repair piping system sections which fail the required piping test by disassembly and reinstallation, using new materials to the extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
  - b. Drain or purge test water, air, or nitrogen from piping system after testing and repair work have been completed.

### 3.6 CUTTING AND PATCHING

- A. Submit written request in advance of cutting or alteration which affects:
  1. Structural integrity of any element of Project.
  2. Integrity of weather exposed or moisture resistant element.
  3. Efficiency, maintenance, or safety of any operational element.
  4. Visual qualities of sight exposed elements.
  5. Work of Owner or separate Contractor.
- B. Execute cutting and patching to complete the work, to uncover work to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of plumbing and electrical work, to execute patching to complement adjacent work, and to fit Products together to integrate with other work.
- C. Execute work by methods to avoid damage to other work, and which 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 air tight 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 Code requirements , to full thickness of the penetrated element.
- I. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

### 3.7 PRIMING AND PAINTING

- A. Apply primer to all exposed ferrous metals that are not factory primed, factory finished, galvanized, stainless steel or anodized. Exposed black steel piping shall be primed and finish painted including black steel piping located outdoors.
  - 1. Primer shall be as recommended by the paint manufacturer for each specific application.
  - 2. Acceptable Products include: Fuller O'Brien Blox-Rust Metal All Purpose Primer, equivalent Rust-Oleum product, or equal. See Section 09 90 00 for other acceptable products.
- B. Apply two coats of primer to metal surfaces of items to be insulated or jacketed, except piping, or factory primed or finished.
- C. Preparation:
  - 1. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
  - 2. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; seal stains and marks which cannot be completely removed using Devoe KILSTAIN primers, shellac, or other coating acceptable to paint manufacturer any marks or defects that might bleed through paint finishes.
  - 3. Remove or protect hardware, electrical plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings which are adjacent to surfaces to receive coatings.
  - 4. Remove mildew from impervious surfaces by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow substrate to thoroughly dry.
  - 5. Galvanized Surfaces:
    - a. Remove surface contamination and oils by solvent cleaning in accordance with SSPC-SP 1 and allow to dry.
    - b. Apply Devoe MIRROLAC Galvanized Metal Primer in accordance with manufacturer instructions.
  - 6. Uncoated Steel And Iron Surfaces:
    - a. Remove grease, rust, scale, and dust from steel and iron surfaces using solvent in accordance with SSPC-SP 1.
    - b. Where heavy coatings of scale or contaminants are evident, hand tool clean in accordance with SSPC-SP 2 or use other approved SSPC SP method as needed.
  - 7. Shop Primed Steel Surfaces: Remove loose primer and dust. Sand and feather edges to smooth surface. Clean areas with solvent and spot prime bare metal surfaces with appropriate Devoe MIRROLAC metal primer or primer recommended by manufacturer.
- D. Application:
  - 1. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.

2. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
  3. Remove dust and other foreign materials from substrate immediately prior to applying each coat.
- E. Finish Painting: See Section 09 90 00.

**END OF SECTION 22 05 10**

**SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe markers.
- E. Ceiling tacks.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 09 91 00 – Painting and Finishing: Identification painting.

**1.3 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.
- B. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- E. Project Record Documents: Record actual locations of tagged valves.

**PART 2 PRODUCTS**

**2.1 IDENTIFICATION APPLICATIONS**

- A. Heat Transfer Equipment (Water Heaters): Nameplates.
- B. Piping: Pipe markers.
- C. Pumps: Nameplates.
- D. Small-sized Equipment: Tags.
- E. Tanks: Nameplates.
- F. Valves: Tags and ceiling tacks where located above lay-in ceiling.

**2.2 MANUFACTURERS**

- A. Brady Corp.
- B. Seton Identification Products.

**2.3 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.
  - 2. Letter Height: Equipment, control panels 1 inch.
  - 3. Letter Height: Thermostats and small control components, 1/4 inch.
  - 4. Background Color: Black.

**2.4 TAGS**

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

- B. Chart: Typewritten letter size list in anodized aluminum frame.

## 2.5 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
  - 1. Access Doors and Similar Operational Instructions: Minimum 3/4" high letters.
- B. Stencil Paint: As specified in Section 09 91 00, semi-gloss enamel, colors conforming to ASME A13.1.

## 2.6 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Secure to pipe using two (2) bands of adhesive tape with flow arrows supplied by the manufacturer. Install securing bands completely around pipe and overlapped.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

## 2.7 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter color coded head.
- B. Color code as follows:
  - 1. Plumbing Valves: Green.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 91 00 for stencil painting.

### 3.2 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- E. Identify domestic hot water heating equipment, including water heaters, pumps, expansion tanks, etc. with plastic nameplates.
- F. Identify valves in main and branch piping with tags.
- G. Tag automatic controls, instruments, and relays. Key to control schematic.
- H. Identify piping, concealed or exposed, with plastic pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
  - 1. Identification shall be applied to all piping, except piping located in furred spaces without access to permit entrance of personnel, and piping buried in the ground or concrete.
  - 2. The legend and flow arrow shall be applied at all valve locations, at all points where piping enters or leaves a wall, partition, cluster of piping, or similar obstruction, and at approximately 20-foot intervals on pipe runs.
  - 3. Practical variations or changes in locations and spacing may be made with the specific approval of the Architect to meet specific conditions.

4. Wherever two or more pipes run parallel, the printed legend and other markings shall be applied in the same relative location so that all piping is easily identified.
5. The marking shall be located so as to be readily conspicuous at all times from any reasonable point of vantage.
6. The legends and flow arrows shall be in the colors as indicated in the pipe-marking schedule.
7. The paint shall be prepared enamel brushed on or sprayed from pressurized cans.
8. Where the pipe marking colors are not easily visible over the background, such as brown on soil pipe, orange on copper pipe, or similar combinations, a neat white or aluminum-colored background shall be painted on the pipe before the markings are applied.
9. The sizes, in inches, of the stenciled lettering and flow arrows shall be as follows:
  - a. 5/8" to 2": 1/2" stencil letter; 2-1/2" flow arrow.
  - b. 2-1/2" to 4": 1" stencil letter; 4" flow arrow.
  - c. 5" to 7": 2" stencil letter; 5" flow arrow.
  - d. 8" and larger: 3" stencil letter; 6" flow arrow.
10. Pipe Marking Legend: Gas - Yellow.

**END OF SECTION 22 05 53**

**SECTION 22 07 19 - PLUMBING PIPING INSULATION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Piping insulation.
- B. Jackets and accessories.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

**1.3 REFERENCE STANDARDS**

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- D. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- E. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- F. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- G. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010.
- H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- J. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- K. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- L. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 5 years of experience.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

## 1.7 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

## PART 2 PRODUCTS

### 2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

### 2.2 GLASS FIBER

- A. Manufacturers:
  - 1. Knauf Insulation: [www.knaufusa.com](http://www.knaufusa.com).
  - 2. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  - 3. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
  - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum Service Temperature: 850 degrees F.
  - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D. Vapor Barrier Lap Adhesive: Compatible with insulation.
  - 1. Compatible with insulation.

### 2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
  - 1. Armacell LLC; Armaflex: [www.armacell.us](http://www.armacell.us).
  - 2. Owens Corning Flex Tubing
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C 534 Grade 3; use molded tubular material wherever possible and sheet for equipment and other surfaces.
  - 1. 'K' value: ASTM C 177; 0.27 at 75 degrees F.
  - 2. Minimum Service Temperature: Minus 40 degrees F.
  - 3. Maximum Service Temperature: 220 degrees F.
  - 4. Maximum Moisture Absorption - Pipe Insulation: 3.5 percent, by weight, when tested in accordance with ASTM D 1056.
  - 5. Water Vapor Permeability: 0.20 perm-inches, when tested in accordance with ASTM E 96.
  - 6. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
  - 1. Manufacturers:
    - a. Armstrong Model 520.
    - b. Owens Corning Model 500.
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Insulation Exposed to the Weather: Cover with aluminum jacket.

### 2.4 JACKETS

- A. PVC Plastic.
  - 1. Manufacturers:
    - a. Proto Corporation, Proto-Wrap 30 LoSmoke.
    - b. Johns Manville Corporation.
  - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: 0 degrees F.

- b. Maximum Service Temperature: 150 degrees F.
- c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
- d. Thickness: 10 mil.
- e. Connections: Brush on welding adhesive.
- 3. Covering Adhesive Mastic: Compatible with insulation.
  - a. Compatible with insulation.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
  - 1. Thickness: 0.016 inch sheet.
  - 2. Finish: Embossed.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

#### **3.2 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- E. Glass fiber insulated pipes conveying fluids above ambient temperature:
  - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
  - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- F. Inserts and Shields:
  - 1. Application: Piping 1-1/2 inches diameter or larger.
  - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
  - 3. Insert Location: Between support shield and piping and under the finish jacket.
  - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
  - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, use a UL rated fire penetration assembly, 3M or equal.
- H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
- I. See Pipe Material Schedule on plans for insulation thickness by pipe system.

**END OF SECTION 22 07 19**



**SECTION 22 08 00 - COMMISSIONING OF PLUMBING SYSTEMS**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to the Work of this Section.
- B. Specific commissioning requirements are given in the following sections of these specifications. It is the contractor's responsibility to coordinate all HVAC systems testing with the GC and all other trades performing related testing services. The division 22 contractor shall provide all T24 required testing by what T24 calls "Certified Acceptance Test Technician". All such tests shall be provided to the districts CxA for inclusion into the CxA reports and submitted according to T24 requirements.
  - 1. 01 91 00, "General Commissioning Requirements"
  - 2. 26 08 08, "Commissioning of Electrical Systems."
  - 3. 23 08 08, "Commissioning of HVAC Systems."
  - 4. ASHRAE Guideline 0-2022 or superseding ASHRAE guideline
  - 5. Title 24 / 2022 Section 120.8 or superseding CA Title 24 requirement

1.2 SUBMITALS

- A. General:
  - 1. Comply with Section –Submittal Procedures.
  - 2. See submittal requirements in Section 01 91 00–General Commissioning Requirements
- B. Prior to pre-functional testing:
  - 1. Provide a TAB plan for approval by the CxA
  - 2. Provide all Pre-Functional Tests for approval to the CxA

1.3 COORDINATION

- A. The Contractor shall coordinate all testing and balancing and major equipment startup and installation with the Commissioning Provider (CxA) and the CM.
- B. For the Plumbing domestic water equipment, the Contractor shall provide a short discussion of the control of the plumbing equipment during the mechanical or electrical training conducted by others.

**PART 2 PRODUCTS**

**2.1 TEST EQUIPMENT**

- A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Trade Contractor for the equipment being tested.
- B. Datalogging equipment or software required to test equipment will be provided by the contractor, if required, but shall not become the property of the Owner.
- C. All testing equipment shall be of sufficient quality and accuracy to test or measure system performance required by the Contract Documents.

**PART 3 EXECUTION**

**3.1 TESTING PREPARATION**

- A. General Procedures are described in Section 01 91 00 – General Commissioning Requirements.
- B. Contractor shall perform all pre-functional performance tests with the tests approved by the CxA. The CxA and the owner shall be advised of all tests as required in this section and by the general commissioning requirements in 01 91 00.
- C. Pre-functional Checklists shall be completed and provided to the CxA for the following Plumbing systems:
  - 1. Contractor to develop, fill out and sign approved pre-functional checklists according to 01 91 00 for the following equipment and systems .These tests shall be provided even if the CxA does not provide related Functional performance tests for these systems:
    - a. Domestic Hot Water System
    - b. Potable water system and booster pumps, as applicable
  - 2. Contractor shall certify that Plumbing systems, subsystems, and equipment are completed, calibrated, and started based on the tests verified and approved by the CxA.

**3.2 FUNCTIONAL PERFORMANCE TESTING**

- A. General procedures are described in the Division 01 Section "General Commissioning Requirements." 01 91 00
- B. Contractor shall execute all functional performance tests provided by the Commissioning Provider. No functional tests shall be performed without the CxA present.
- C. The details of the functional performance tests shall be reviewed and refined during the construction phase by the CxA. The final test will be provided to the contractor at least 5 business days before the test is conducted.

**3.3 ELECTRONIC DOCUMENT REQUIREMENTS**

- A. All working documents shall be provided in electronic format whenever feasible. Hard copies are only permissible if soft copies of the documents are not available.
- B. In addition to the hard copy requirements required in this section, at least all final documents shall be provided un pdf format, organized and tabulated identical to any hard copies provided. Coordinate media requirements with the owner at the time of submission

END OF SECTION

**SECTION 22 10 05 - PLUMBING PIPING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Chemical resistant sewer.
  - 3. Drains.
  - 4. Domestic water.
  - 5. Storm water.
  - 6. Gas.
  - 7. Flanges, unions, and couplings.
  - 8. Pipe hangers and supports.
  - 9. Valves.
  - 10. Check.
  - 11. Relief valves.
  - 12. Strainers.
- B. Piping system work includes but not limited to:
  - 1. Aboveground soil, waste and vent piping within buildings, including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains.
  - 2. Underground building drain piping including mains, branches, traps, connections to fixtures and drains, and connections to stacks, terminating at connection to sanitary sewers 5 feet outside foundation wall.
  - 3. Conductor piping from roof drains to storm building drain.
  - 4. Storm building drain piping from conductor piping and area drains terminating at connection to storm sewers 5 feet outside foundation wall.
  - 5. Domestic cold water piping.
  - 6. Domestic hot water piping.
  - 7. Domestic circulating hot water piping.
  - 8. Specialty piping systems.
  - 9. Natural Gas System: Including new service connection and piping/meter assembly by serving utility company and costs/fees involving rough-in and connection to meter connections to gas equipment.
  - 10. Condensate drain and water piping system for plumbing equipment.
  - 11. Flashing and counterflashing of roof and wall penetrations required by installation of work of this Section.
  - 12. Furnishing and installation of access doors required for work furnished by this Section.
  - 13. Furnishing and installing of sleeves, inserts and anchorage required for the installation, which are embedded in work of other trades. Sleeve, wrap and seal piping in concrete.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 08 31 13 - Access Doors and Panels.
- C. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
- D. Section 22 07 19 - Plumbing Piping Insulation.

**1.3 REFERENCE STANDARDS**

- A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 1999, and addenda A&B (R2004).
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.

- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- E. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV; 2011.
- F. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; 2012.
- G. ASME B31.1 - Power Piping; 2014.
- H. ASME B31.9 - Building Services Piping; 2014.
- I. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2015.
- J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.
- K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- L. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2015.
- M. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- N. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- O. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a.
- P. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- Q. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- R. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2013.
- S. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.
- T. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).
- U. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings; 2014.
- V. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2014.
- W. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).
- X. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- Y. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2010.
- Z. AWWA C651 - Disinfecting Water Mains; 2005.
- AA. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009.
- AB. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011.
- AC. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- AD. MSS SP-67 - Butterfly Valves; 2011.
- AE. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- AF. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2011.
- AG. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.

- AH. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- AI. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- AJ. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- AK. NSF 372 - Drinking Water System Components - Lead Content; 2011.

#### 1.4 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with State of California, standards.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

#### 1.6 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of California plumbing code.
- B. All plumbing piping, valves, etc. shall comply with State of California SB 1953 to be certified as lead free.
- C. Conform to applicable code for installation of backflow prevention devices.
- D. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

### PART 2 PRODUCTS

#### 2.1 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

#### 2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: CISPI 301, hubless.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310 with MG couplings.
  - 3. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies. Heavy duty, Husky SD4000, .015 inch thick 304 stainless steel shield, 4-band coupling.

#### 2.3 SANITARY SEWER AND VENT PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

- B. Copper Tube: ASTM B 306, DWV or ASTM B 88 (ASTM B 88M), Type L
  - 1. Application: Condensate drains.
  - 2. Fittings: ASME B16.22, wrought copper
  - 3. Joints: ASTM B32, alloy Sn50 solder.
- 2.4 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
  - A. Copper Pipe: ASTM B 42, hard drawn, Type K.
    - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
    - 2. Joints: AWS A5.8, BCuP silver braze. Approved Fillers: "Phos 0," "Silfos 5," "Aircosil 15," "Braze 450(DE)." Use appropriate flux per manufacturer's recommendations.
- 2.5 DOMESTIC WATER PIPING, ABOVE GRADE
  - A. Copper Tube: ASTM B88 (ASTM B88), Type L.
    - 1. Fittings: ASME B16.22, wrought copper
    - 2. Joints: ASTM B 32, alloy Sn95 solder or AWS A5.8, BCuP5 silver braze.
    - 4. Pressure Range 81 to 150 PSI and Temperatures 151F to 200F: 95/5 tin-antimony or silver-bearing solders, i.e., Allstate 430, Harris Stay Brite 5 or 8.
  - B. Provide full solder cup for all fittings.
  - C. Schedule 40 Screwed Brass: Capped or plugged outlets.
- 2.6 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
  - A. Cast Iron Pipe: CISPI 301, hubless, service weight.
    - 1. Fittings: Cast iron.
    - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies. Heavy duty, Husky SD4000, .015 inch thick 304 stainless steel shield, 4-band coupling.
- 2.7 STORM WATER PIPING, ABOVE GRADE
  - A. Cast Iron Pipe: CISPI 301, hubless, service weight.
    - 1. Fittings: Cast iron.
    - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- 2.8 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING
  - A. Schedule 40, A53 black steel pipe and threaded malleable fittings 2 1/2 inches and smaller. Welded pipe 3 inches and larger. Pipe below grade wrapped with double thickness Scotchwrap No. 51 applied over Scotchwrap pipe primer. Factory applied epoxy coating to equivalent thickness with field wrapped or epoxied joints approved. Provide tinker test to check for holidays. Provide cathodic protection to meet requirements of NACE Standard RP0169-2002.
  - B. Polyethylene Pipe: ASTM D2513, SDR 11.
    - 1. Fittings: ASTM D2683 or ASTM D2513 socket type.
    - 2. Joints: Fusion welded.
    - 3. Pipe below grade shall have an insulated copper tracer wire installed adjacent to underground nonmetallic gas piping. Tracer wire insulation: yellow. Tracer wire shall meet requirements of CPC 1211.19.
- 2.9 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING
  - A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
    - 1. Fittings: ASTM A234/A234M, wrought steel welding type.
    - 2. Joints: ASME B31.1, welded.
    - 3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
- 2.10 NATURAL GAS PIPING, ABOVE GRADE
  - A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
    - 1. Pipe size 2-1/2" and smaller: Malleable iron threaded fittings.
    - 2. Pipe size 3" and larger: Steel butt welded fittings.

3. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
4. Joints: Threaded or welded to ASME B31.1.
5. Black steel piping exposed outdoors shall be painted. Refer to Sections 23 05 10 and 09 90 00.

#### 2.11 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 2 Inches and Under:
  1. Steel Pipe Union: 150 PSI malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe.
  2. Copper Pipe Union: 200 PSI working pressure. Bronze body, solder or grooved ends. Pipes 2 inches and under use ground joint, pipes 2-1/2 inches and larger use flanged face or grooved ends.
  3. Insulating Unions: 250 PSI working pressure. Pipe ends and material to match piping. Electric current below 1 percent of galvanic current. Gasket material as recommended by manufacturer. Epcor approved.
- B. Flanges for Pipe Size Over 1 Inch:
  1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
  2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

#### 2.12 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
  1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
  2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
  3. Trapeze Hangers: Welded steel channel frames attached to structure.
  4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping - Drain, Waste, and Vent:
  1. Conform to MSS SP-58.
  2. Steel hanger rods and clevis shall be cadmium or zinc plated.
  3. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
  4. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  6. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  7. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  8. Vertical Support: Steel riser clamp.
  9. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  10. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:
  1. Conform to MSS SP-58.
  2. Steel hanger rods and clevis shall be cadmium or zinc plated.
  3. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
  4. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  5. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
  6. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  7. Vertical Support: Steel riser clamp.
  8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.



### 2.13 GATE VALVES

- A. Manufacturers:
  - 1. Nibco, Inc: [www.nibco.com](http://www.nibco.com).
  - 2. Crane Co. Valve Division
  - 3. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
- B. Up To and Including 2 Inches:
  - 1. Class 125, bronze, screw in bonnet, solid wedge. Rising Stem: Nibco 111. Nonrising Stem: Nibco 113.
- C. 2-1/2 Inches and Larger:
  - 1. Class 125, iron body, bolted bonnet, flanged ends, renewable seat and disc, bronze mounted. Straight Body: Nibco F 718 B. Angle Body: Nibco F 818 B.

### 2.14 VALVES - GENERAL

- A. General:
  - 1. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.
  - 2. Operators: Provide handwheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves 6 inches and smaller, and 4 inches and smaller for plug valves. Provide gear operators for quarter-turn valves 8 inches and larger. Provide chain-operated sheaves and chains for overhead valves.
  - 3. End Connections: Mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is installer's option.
- B. Service:
  - 1. Domestic Hot and Cold Water Shutoff and Isolation Valves:
    - a. Pipe Sizes 2-1/2 Inches and Smaller: Ball valve.
    - b. Pipe Sizes 3 Inches and Larger: Gate valve or butterfly valve.
  - 2. Drain Service; All Pipe Sizes: Drain valves.
  - 3. Bypass Around Pressure-Reducing Valves: Globe valves.
  - 4. Check Valves: Swing check.
  - 5. Relief Valve: ASME code approved pressure and temperature relief valve. Run full size pipe to floor drain, or as noted otherwise. Cash-Acme, Watts, or approved.
  - 6. Pressure Regulating Valves: Natural Gas/L.P.G.: Diaphragm and spring actuated type, with ventless or vented relief feature. Construction, pressure range and venting features suitable for intended service. Regulator to meet code and serving utility requirements. Pipe vented type to atmosphere in approved location. Maxitrol, Equimeter, or approved.
- C. Manufacturers: Crane, Fairbanks, Anvil, Jenkins, Kennedy, Walworth, Red/White (commercial grade), Mueller, Legend, Conbraco, Nibco, DeZurik, Hays, Powell, Stockham, Hammond, Watts, Milwaukee, or approved. Note: See individual sections for specialty valves (balancing valves, pressure regulators, relief valves, earthquake valves, gas valves).

### 2.15 BALL VALVES

- A. Manufacturers:
  - 1. Nibco, Inc: [www.nibco.com](http://www.nibco.com).
  - 2. Crane Co., Valve Division
  - 3. DeZurik Co.
  - 4. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
  - 5. Stockham Valves and Fittings, Inc.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, three piece body, stainless steel ball, full port, teflon seats and stuffing box ring, stainless steel blow-out proof stem, lever handle with balancing stops, threaded ends with union. Nibco T-595-Y. Soldered: Nibco S-595-Y

**2.16 NATURAL GAS VALVES**

- A. 2 Inches and Smaller: Ball valves. UL listed, two-piece construction, threaded, bronze body, conventional port, 250 PSI WOG working pressure. Watts B-6000UL.
- B. 2-1/2 Inches and Larger: 100 to 125 PSI rated bronze or iron body/bronze trimmed plug cock type, square head or tee/lever handle operation. CSA approved.

**2.17 GAS PRESSURE REGULATING VALVES**

- A. Manufacturers:
  - 1. American Meter.
  - 2. Invensys (Equimeter).
  - 3. Maxitrol
- B. Provide single stage, steel jacketed, corrosion resistant gas pressure regulating valves with atmospheric vent and elevation compensator sized for inlet and outlet pressures, specific gravity and volume indicated on the drawings. Construction, pressure range and venting features suitable for intended service. Regulator to meet code and serving utility requirements. Pipe vented type to atmosphere in approved location.
- C. For sizes 2" and smaller: threaded ends.
- D. For sizes 2-1/2" and larger: flanged ends.
- E. Provide low pressure cutout and internal relief for each regulator.

**2.18 SEISMIC GAS SHUTOFF VALVES**

- A. Manufacturers: Safetquake, Quakemaster or equal.
- B. Valve is fabricated of aluminum, incorporates a stainless steel ball and bubble level, is vertically mounted, has a single step manual reset lever, operates at ambient temperature range of -40 deg F to +150 Deg F, minimum pressure .5 psi and maximum allowable pressure of 60 psi.
- C. Valves actuates within 5 seconds when subjected to a horizontal sinusoidal oscillation having a peak acceleration of anyone of the following: (1) 0.70g and period of 0.13 second, (2) 0.40g and period of 0.20 second, (3) 0.30g and period of 0.40 second, (4) 0.25g and period of 1.00 second.
- D. Valves shall not actuate when subjected for 5 seconds to a horizontal sinusoidal oscillation having a peak acceleration of anyone of the following: (1) 0.40g and period of 0.130second, (2) 0.20g and period of 0.20 second, (3) 0.15g and period of 0.40 second, (4) 0.10g and period of 1.00 second.
- E. Meets or exceeds California standard, ANSI (Z21 1995), California Office of State Architect (Label Numbers CA-OSA 19.49 and CA-OSA 27.02, IAPMO, UPC (file 3D94), AGA P-70-2A, U.L. Building and Safety RR 4996.

**2.19 BUTTERFLY VALVES**

- A. Manufacturers:
  - 1. Grinnell Products, a Tyco Business; B302: [www.grinnell.com](http://www.grinnell.com).
  - 2. Hammond Valve: [www.hammondvalve.com](http://www.hammondvalve.com).
  - 3. Crane Co.: [www.cranevalve.com](http://www.cranevalve.com).
  - 4. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
  - 5. Stockham Valves and Fittings, Inc.
- B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.
- C. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

**2.20 SWING CHECK VALVES**

- A. Manufacturers:

1. Nibco, Inc: [www.nibco.com](http://www.nibco.com).
  2. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
- B. Up to 2 Inches:
1. MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends. Nibco 413.
- C. Over 2 Inches:
1. MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged ends. Nibco F918.

## 2.21 RELIEF VALVES

- A. Temperature and Pressure Relief:
1. Manufacturers:
    - a. Watts Regulator Company: [www.wattsregulator.com](http://www.wattsregulator.com).
    - b. Cash-Acme
  2. AGA Z21.22 certified, bronze body, manual lever operator, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled. Sized to meet BTUH requirements.

## 2.22 STRAINERS

- A. Manufacturers:
1. Armstrong International, Inc: [www.armstronginternational.com](http://www.armstronginternational.com).
  2. Charles M. Bailey.
  3. Metraflex.
- B. Size 2-1/2 inch (64 mm) to 4 inch (100mm):
1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

## 2.23 WATER VALVE BOXES

- A. Rectangular concrete valve box with cast iron hinged locking access cover, (traffic rated), labeled "water." Provide size adequate for depth, maintenance accessibility for valve assembly, and the like. Provide extensions as required. Manufacturers: Brooks Products Model 36-HFL, or approved.

## 2.24 PREMANUFACTURED COUNTERFLASHINGS

- A. Factory-fabricated counterflashing constructed from Schedule 40 galvanized steel or galvanized malleable iron pipe coupling with tapered threads and 3 lb. lead sheet lead formed and soldered to coupling to produce counterflashing minimum of 4-inch overlap over roof flashings. Provide for pipe sizes as required. Manufacturers: A&B Sheetmetal, 503-254-5581.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

### 3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### 3.3 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. Conform with applicable codes and industry standards.
- C. Install uninsulated piping so that unrestrained direct contact with the structure or other system installations is avoided. Where contact with or passage through building or structural features cannot be avoided; firmly anchor piping to, or isolated from, the structure to prevent noise

transmission and occurrence of physical damage. Install piping to be insulated with adequate clearance around piping to allow for placement of full thickness insulating material.

- D. Corrosion Control:
  - 1. Underground Steel Piping Corrosion Protection: Factory wrap uninsulated underground steel piping systems with protective coating composed of a coal-tar saturated wrapping tape over a 20 mil thick coal-tar epoxy coating, equivalent to "Republic X-Tru-Coat." Wrap joints spirally with a minimum overlap of 1/2 tape width. Extend wrap not less than 3 inches above grade. Provide tinker test to check for holidays. Provide cathodic protection to meet requirements of NACE Standard RP0169-2002.
  - 2. Install hot water heating vessels with a stainless steel fitting at tank and a dielectric fitting on both supply and discharge sides of hot water tanks.
- E. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- F. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- G. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- H. Group piping whenever practical at common elevations.
- I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- J. Installation/Coordination:
  - 1. Expansion and Flexibility: Install work with due regard for expansion, contraction, and building settlement to prevent damage to the piping, ductwork, equipment and the building and its contents. Provide piping offsets, loops, expansion joints, anchors or other means to control pipe movement, to minimize pipe forces and effects of building settlement.
  - 2. Install piping to prevent stresses and strains to piping and hangers and supports due to expansion or contraction and building settlement. Provide proper loops, guides, offsets, anchor points, or expansion joints. Verify with anticipated settlement or shrinkage of building. Verify construction phasing of project, type of building construction products and type for coordinating installation of piping systems. Include provisions for servicing and removal of equipment without dismantling piping.
- K. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- L. Provide access where valves and fittings are not exposed.
- M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
- N. Excavate in accordance with the paragraphs in this Section and Divisions 31 and 32 for work of this Section.
- O. Backfill in accordance with the paragraphs in this Section and Divisions 31 and 32 for work of this Section.
- P. Install underground valves in valve box, Christy or equal, sized to allow access for maintenance.
- Q. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- R. Sleeve pipes passing through partitions, walls and floors.
- S. Pipe Sleeves:
  - 1. Lay out work in advance of pouring concrete and furnish and set sleeves necessary to complete work.
  - 2. Floor Sleeves (Except DWV Piping at Slab on Grade): Provide sleeves on pipes passing through concrete or masonry construction. Extend sleeve 1 inch above finished floor. Caulk pipes passing through floor with nonshrinking grout or approved caulking compound. Provide "Link-Seal" sleeve sealing system for slab on grade. Caulk/seal

3. piping and ductwork passing through fire rated building assembly with UL rated assemblies. Provide fire-rated assemblies per local AHJ requirements.
3. Wall Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Provide sleeve flush with finished face of wall. Caulk pipes passing through walls with nonshrinking caulking compound. Caulk/seal piping and ducts passing through fire-rated building assemblies with UL approved fire-rated assemblies. Provide fire-rated assemblies per local AHJ requirements.
  4. Beam Sleeves: Coordinate with trades for locations of pipe sleeves in reinforced concrete and steel beams. Penetrations must be indicated on structural shop drawings. See Drawings and Specifications for specific sleeve location limitations. Plumbing Drawings are diagrammatic. Offset piping as required to meet these limitations. Pipe sleeve locations must be indicated on reinforced concrete and steel beam shop drawings. Field cutting of beams not allowed without written approval of structural engineer. No extra costs allowed for failure to coordinate beam penetrations prior to reinforced concrete and steel beam shop drawing submittal.
- T. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9.
  2. Support horizontal piping as scheduled.
  3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  4. Place hangers within 12 inches of each horizontal elbow.
  5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  6. Provide copper plated hangers and supports for copper piping.
  7. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

### 3.4 PIPING SYSTEMS INSTALLATION

- A. Piping:
1. General: Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous materials as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops. Coordinate installation of piping below with structural components and other system installations.
  2. Establish elevations of buried piping outside the building to ensure not less than 2 ft of cover.
  3. Install piping pitched to drain at minimum slope of 1/4 inch per foot (2 percent). Where this slope is impractical, slope at 1/4 inch per foot for pipes below 4-inch size, and 1/8 inch per foot (1 percent) for piping 4 inches and larger, with the approval of the local code authority.
  4. Install water piping to ASME B31.9.
  5. Condensate Drain Piping at HVAC Units: Trap condensate drain for HVAC units. Install condensate drain piping with p-trap and slope to drain at minimum of 1/8 inch per foot slope.
  6. Seismic Restraint: Brace plumbing piping and plumbing equipment against lateral movement as detailed in document "Seismic Restraint Manual Guidelines for Plumbing Systems" as published by SMACNA.
  7. Rough-in Piping: Provide temporary caps or plugs at piping shown on Drawings to be roughed-in for future connections by others.

8. Sanitary Waste and Storm Drain Piping: Slope at uniform grade of 1/4 inch per foot unless noted otherwise. Make changes in size with reducing and wye fittings. Run exposed piping parallel or perpendicular to building structure.
  9. Sanitary Waste Piping from Back-to-Back Water Closets: Provide individual rough-in piping for each back-to-back water closet, no common sanitary cross, double fixture or double combination wye and 1/8 bend fittings allowed.
  10. Vent Piping:
    - a. General: Horizontal runs free of drops and sloped to drainage system.
    - b. Do not locate waste vents in equipment wells; locate waste vents down wind from outside air intakes of HVAC equipment.
    - c. Vents-Through-Roof (VTRs): Provide flashing with counterflashing at vent penetrations through roof, as detailed. Install vent piping penetrating roofed areas to maintain integrity of roof assembly. Wherever vents run up near or inside of exterior walls, offset pipe at underside of roof deck to obtain minimum 5-foot clearance between parapet and roof penetration. Provide code required clearances between vent-through-roof and HVAC equipment on roof. VTR counterflashings to have a manufactured rolled return bend with minimum 1-inch overlap; crimping by hand tools will not be allowed. On single ply vinyl or plastic type roofs, provide flashings as required by roof installer and manufacturer. On raised rib steel roofs, provide flashings as required by roof installer and manufacturer.
- B. Cleanouts: Install in aboveground piping and building drain piping as indicated, as required by code; at each change in direction of piping greater than 135 degrees; at minimum intervals of 100 feet; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping. Select type to match adjacent building finish. Coordinate locations and types of cleanouts with Architect prior to installation.
- C. Equipment Connections:
1. Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by code.
  2. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.
  3. Piping Runouts to Fixtures: Provide hot and cold piping runouts to fixtures of sizes indicated, but in no case smaller than required by code.
  4. Equipment Connections: Connect hot and cold water piping system to equipment as indicated, and comply with equipment manufacturer's instructions. Provide shutoff valve and union for each connection; provide drain valve on drain connection.
- D. Domestic Water Distribution Piping:
1. Water Service Piping: Provide sleeve in foundation wall for water service entry; make entry watertight. Provide shutoff valve at water service entry inside building; pressure gauge, test tee with valve.
  2. Water Hammer Arrestors: Install in upright position, in locations and of sizes in accordance with PDI WH-201, and elsewhere as indicated.
  3. Group piping installations and valves where possible to obtain maximum practical use of available space.
  4. Arrange locations of valves, unions, drains and other components to provide for ease of cleaning, operation, repair or service. Size access panels and locate to provide both acceptable proximity and working space for such devices.
  5. Provide valves and shock arrestors where required by code and where otherwise indicated in Specifications and on Drawings.
  6. Provide protection plates for piping installed in wood stud walls and other building substructures as required by code.
  7. Wherever piping is installed in exterior walls, route on warm side of insulation and as close to inside wall finish as possible, as detailed.
  8. Provide low point drains and shutoff valves as required by local AHJ. Provide valve boxes, access panels, and the like, for complete installation.

- E. Valves:
    - 1. Install valves with stems upright or horizontal, not inverted.
    - 2. Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves two or more plumbing fixtures or equipment connections, and elsewhere as indicated.
    - 3. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
    - 4. Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain domestic water piping system.
    - 5. Check Valves: Install on discharge side of each pump, and elsewhere as indicated.
    - 6. Balancing Valves: Install in each hot water recirculating loop, and elsewhere as indicated.
  - F. Pressure Regulating Valves: Provide inlet and outlet ball valves, and globe valve bypass. Provide pressure gauge on valve outlet.
  - G. Gas Piping:
    - 1. General: Provide shutoff valves, pressure regulators and unions at connections to gas-fired equipment. Provide dirt legs at low points.
    - 2. Install gas piping in accordance with NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 1999. Purge, clean and charge piping in accordance with NFPA 54.
    - 3. Adjust gas pressure regulating valves at full load condition to deliver required gas pressure to equipment.
    - 4. Provide support for utility meters in accordance with requirements of utility companies.
    - 5. Piping Through Roof: Coordinate exact location with roof structure and roof mounted equipment. Provide 2-1/2 lb. lead flashing with manufactured counterflashing at roof penetration.
    - 6. Paint piping exposed to weather with one coat of Rustoleum.
    - 7. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
  - H. Gas Regulator Vent Piping: Paint piping exposed to weather with one coat of Rustoleum.
- 3.5 FIRESTOPPING PENETRATIONS IN FIRE-RATED WALL/FLOOR ASSEMBLIES
- A. Provide proper sizing when providing sleeves or core-drilled holes to accommodate the penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet the requirements of ASTM E814.
  - B. Manufacturers: Hilti, Proset, or approved.
- 3.6 EXCAVATION AND BACKFILL:
- A. General: Perform necessary excavation and backfill required for installation of plumbing work. Repair piping or other work damaged by Contractor's operations.
  - B. Water: Keep excavations free of standing water. Reexcavate and fill back excavations damaged or softened by water or frost to original level with sand, crushed rock or other approved material at no expense to Owner.
  - C. Tests: During progress of work for compacted fill, Owner reserves right to request compaction tests made under direction of a testing laboratory.
  - D. Trench Excavation: Excavate trenches to necessary depth and width, removing rocks, unstable soil (muck, peat, and the like), roots and stumps. Excavation material is classified as "base fill" and "native." Base fill excavation material consisting of placed crushed rock may be used as backfill above "Pipe Zone." Remove and dispose off site native excavation material at no expense to Owner. Adequate width of trench for proper installation of piping or conduit.
  - E. Support Foundations:

1. Foundations: Excavate trenches located in unstable ground areas below elevation required for installation of piping to a depth which is determined by Architect as appropriate for conditions encountered. Place and compact approved foundation material in excavation up to "Bedding Zone." Dewatering, placement, compaction and disposal of excavated materials to conform to requirements contained in other sections of Specifications or drawings.
  2. Over-Excavations: Where trench excavation exceeds required depths, provide, place and compact suitable bedding material to proper grade or elevation at no additional cost to Owner.
  3. Foundation Material: Where native material has been removed, place and compact necessary foundation material to form a base for replacement of required thickness of bedding material.
    - a. Material Passing 3/4-Inch Square Opening:
      - 1) Class A: Min 27; Max 47.
      - 2) Class B: Min 0; Max 1.
- F. Bedding Material: Full bed site piping on sand, pea gravel or 3/4-inch minus crushed rock. Place a minimum 4-inch deep layer of sand or crushed rock on leveled trench bottom for this purpose. Remove bedding to necessary depth for piping bells and couplings to maintain contact of pipe on bedding for its entire length. Provide additional bedding in excessively wet, unstable, or solid rock trench bottom conditions as required to provide a firm foundation.
- G. Backfilling:
1. Following installation and successful completion of required tests, backfill piping in lifts.
    - a. In "Pipe Zone," place backfill material and compact in lifts not to exceed 6 inches in depth to a height of 12 inches above top of pipe. Place backfill material to obtain contact with entire periphery of pipe, without disturbing or displacing pipe.
    - b. Place and compact backfill above "Pipe Zone" in layers not to exceed 12 inches in depth.
  2. Backfill Material:
    - a. Backfill Material in "Pipe Zone": 3/4-inch minus crushed rock, sand or pea gravel.
    - b. Crushed rock, fill sand or other backfill material approved elsewhere in Specifications may be used above "Pipe Zone."
- H. Compaction of Trench Backfill:
1. Where compaction of trench backfill material is required, use one of following methods or combination thereof:
    - a. Mechanical tamper,
    - b. Vibratory compacter, or
    - c. Other approved methods appropriate to conditions encountered.
  2. Architect to have right to change methods and limits to better accommodate field conditions. Compaction sufficient to attain 95 percent of maximum density at optimum moisture content unless noted otherwise on Drawings or elsewhere in Specifications. Water "puddling" or "washing" is prohibited.
- 3.7 APPLICATION
- A. Install unions downstream of valves and at equipment or apparatus connections.
  - B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
  - C. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
  - D. Install globe valves for throttling, bypass, or manual flow control services.
  - E. Provide ball valves in natural gas systems for shut-off service.
- 3.8 TOLERANCES
- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.



- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

**3.9 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM**

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

**3.10 SERVICE CONNECTIONS**

- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 11 inch wg.

**3.11 SCHEDULES**

- A. Pipe Hanger Spacing:
  - 1. Metal Piping:
    - a. Pipe Size: 1/2 inches to 1-1/4 inches:
      - 1) Maximum Hanger Spacing: 6.5 ft.
      - 2) Hanger Rod Diameter: 3/8 inches.
    - b. Pipe Size: 1-1/2 inches to 2 inches:
      - 1) Maximum Hanger Spacing: 10 ft.
      - 2) Hanger Rod Diameter: 3/8 inch.
    - c. Pipe Size: 2-1/2 inches to 3 inches:
      - 1) Maximum Hanger Spacing: 10 ft.
      - 2) Hanger Rod Diameter: 1/2 inch.
    - d. Pipe Size: 4 inches to 6 inches:
      - 1) Maximum Hanger Spacing: 10 ft.
      - 2) Hanger Rod Diameter: 5/8 inch.

**END OF SECTION 22 10 05**

**SECTION 22 10 06 - PLUMBING PIPING SPECIALTIES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Drains.
- B. Roof and floor drains.
- C. Cleanouts.
- D. Hose bibbs.
- E. Hydrants.
- F. Water hammer arrestors.
- G. Trap primers.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 22 10 05 - Plumbing Piping.
- C. Section 22 40 00 - Plumbing Fixtures.

**1.3 REFERENCE STANDARDS**

- A. ASME A112.6.3 - Floor and Trench Drains; 2001 (R2007).
- B. ASME A112.21.2M - Roof Drains; The American Society of Mechanical Engineers 2001.
- C. ASSE 1011 - Hose Connection Vacuum Breakers; 2004.
- D. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- E. NSF 372 - Drinking Water System Components - Lead Content; 2011.
- F. PDI-WH 201 - Water Hammer Arresters; 2010.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- E. Project Record Documents: Record actual locations of equipment, cleanouts, water hammer arrestors.
- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Accept specialties on site in original factory packaging. Inspect for damage.

**PART 2 PRODUCTS**

**2.1 GENERAL REQUIREMENTS**

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.
- B. Products specified on plan sheets supersede those indicated in this section.

## 2.2 DRAINS

- A. Manufacturers:
  - 1. Josam Company: [www.josam.com](http://www.josam.com).
  - 2. Jay R. Smith Manufacturing Company.
  - 3. Zurn Industries, LLC: [www.zurn.com](http://www.zurn.com).
  - 4. Watts.
  - 5. Mifab.
  - 6. Approved equal.
- B. Roof Drains:
  - 1. Manufacturer: Zurn Model Z-125-92 combination roof drain and overflow drain or Zurn Model Z-125 for roof drain and for overflow drain.
  - 2. Assembly: ASME A112.21.2M.
  - 3. Body: Lacquered cast iron with sump.
  - 4. Strainer: Removable polyethylene dome with vandal proof screws.
  - 5. Overflow: Lacquered cast iron body and clamp collar and bottom clamp ring; pipe extended to 2 inches above flood elevation.
  - 6. Accessories: Coordinate with roofing type:
    - a. Membrane flange and membrane clamp with integral gravel stop.
    - b. Adjustable under deck clamp.
    - c. Roof sump receiver.
    - d. Waterproofing flange.
    - e. Controlled flow weir.
    - f. Leveling frame.
    - g. Adjustable extension sleeve for roof insulation.
- C. Downspout Nozzles:
  - 1. Bronze round with straight bottom section. Zurn Z-199, J.R. Smith, Mifab, or approved equal.
- D. Floor Drain (FD):
  - 1. ASME A112.6.3; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer. Zurn, J.R. Smith, Wade, Watts, Mifab, or approved equal.

## 2.3 CLEANOUTS

- A. General: Locate cleanouts as shown on Drawings and as required by local code. Cleanouts same size as pipe except that greater than 4 inches will not be required. Plastic components not allowed, except unless specifically noted.
- B. Types:
  - 1. Tile Floor Cleanouts: J. R. Smith 4020-U with round heavy-duty nickel bronze top, taper thread, ABS plug and vandalproof screws.
  - 2. Carpeted Floor Cleanout: J. R. Smith 4020-U-X with carpet clamping frame with round heavy-duty nickel bronze top, taper thread, ABS plug, carpet clamping device and vandalproof screws.
  - 3. Concrete Floor Cleanout (General): J. R. Smith 4020 with round heavy-duty nickel bronze top, taper thread and ABS plug with vandalproof screws.
  - 4. Concrete Floor Cleanout (Heavy Load): Same as for "General" locations, Item 3 above, except J. R. Smith 4100.
  - 5. Wall Cleanout: J. R. Smith 4472-U, countersunk bronze taper thread plug, stainless steel shallow cover and vandalproof screws.
  - 6. Cleanouts in concealed aboveground cast iron soil or waste lines: Zurn Z-1440A with raised head ABS plastic plug.
  - 7. Outside Area Walks and Drives: J. R. Smith 4023-U with round heavy-duty nickel bronze top, taper thread, ABS plug and top secured with vandalproof screws. Install in 18- by 18- by 6-inch deep concrete pad flush with grade.

- C. Manufacturers: J. R. Smith, Zurn, Wade, Watts, or approved. J. R. Smith model numbers used as a basis of selection.

#### 2.4 HOSE BIBBS

- A. Manufacturers:
  - 1. Interior: Acorn Model 8121CR-LF; Exterior (roof): Acorn Model 8126-LF.
  - 2. Jay R. Smith Manufacturing Company.
  - 3. Watts Regulator Company: [www.wattsregulator.com](http://www.wattsregulator.com).
  - 4. Zurn Industries, LLC: [www.zurn.com](http://www.zurn.com).
  - 5. Woodford.
  - 6. Mifab.
- B. Interior Hose Bibbs:
  - 1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, rough chrome plated where exposed with lockshield and removable key, integral vacuum breaker in conformance with ASSE 1011.
- C. Exterior Hose Bibbs:
  - 1. Bronze or brass, replaceable hexagonal disc, hose thread spout with wall plate, bronze nickel plated finish with lockshield and removable key, integral vacuum breaker in conformance with ASSE 1011.

#### 2.5 HYDRANTS

- A. Manufacturers:
  - 1. Acorn Model 8151 (cold water only).
  - 2. Jay R. Smith Manufacturing Company: [www.jayrsmith.com](http://www.jayrsmith.com).
  - 3. Zurn Industries, LLC: [www.zurn.com](http://www.zurn.com).
  - 4. Woodford.
  - 5. Chicago.
  - 6. Mifab.
  - 7. Approved equal.
- B. Wall Hydrants:
  - 1. ASSE 1019; valve shall be cartidge operated type with stainless steel lockable recessed box with wall flange, hose thread spout, lockshield and removable key, and integral vacuum breaker.

#### 2.6 WATER HAMMER ARRESTORS

- A. Manufacturers:
  - 1. Jay R. Smith Manufacturing Company: [www.jayrsmith.com](http://www.jayrsmith.com).
  - 2. Zurn Industries, LLC: [www.zurn.com](http://www.zurn.com).
  - 3. Amtrol.
  - 4. Wade.
  - 5. Approved equal.
- B. Water Hammer Arrestors:
  - 1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F, maximum 125 psi working pressure and maximum 250 psi static pressure.

#### 2.7 TRAP PRIMERS

- A. Provide trap primers, 1/2 inch size, where indicated on drawings. Provide with built-in air gap and install 1/2" shutoff valve. PVC housings are not acceptable. Code approval required. Install trap primer line with 1/4" per foot slope to insure full drainage to floor drain or floor sink. Install trap primer behind wall with J.R. Smith 4740 access door. Manufacturer: Zurn, J.R. Smith, Wade, PPP, or approved equal.
- B. Provide a distribution unit with feeder piping for a maximum of four (4) traps where multiple traps are serviced by a single trap primer.

## 2.8 THERMOMETERS

- A. 3-inch diameter bi-metal dial thermometer with stainless steel case, white dial, black numbers with 4-inch stainless steel stem and brass separable socket. Provide back or bottom connections as required. 0F to 200F range. Manufacturers: Weiss Model 3BMS, Palmer, Ashcroft, Trerice, Marshaltown, Weksler, or approved.

## 2.9 PRESSURE GAUGES

- A. Single-pointer gauge with 0 to 100 PSI range, 10 PSI intervals and 1 PSI increments intermediate graduations. Aluminum dial with 1 percent accuracy and low bottom connections for wall mounting. Manufacturers: Weiss, Palmer, Marshaltown, Trerice, Ashcroft, Weksler, U.S. Gauge, or approved.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install cleanouts in all horizontal soil and waste piping at 50 feet maximum spacing inside building, 100 feet maximum spacing outside building, at every change of direction and where shown on Drawings.
- E. Install cleanouts in waste drops from each lavatory and sink.
- F. Install cleanouts in rain water (storm drain) drops 18 inches above finished floor. For concealed rainwater drops extend cleanout to building exterior for access.
- G. Install floor cleanouts at elevation to accommodate finished floor.

#### H. FLOOR DRAINS AND FLOOR SINKS

- 1. General: Install drains in accordance with manufacturer's written instructions and in locations indicated.
- 2. Coordinate with piping as necessary to interface drains with drainage piping systems.
- 3. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of floor drains flush with finished floor. Set floor sinks as required by local codes.
- 4. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
- 5. Position drains so that they are accessible and easy to maintain.
- 6. Coordinate drain flashing, flanges and strainer types and depths with floor substrate and topping configuration.
- 7. Primers: Prime drains. Refer to Drawings and coordinate location with Architect. Coordinate with local AHJ for exact requirements.

#### I. ROOF DRAINS/OVERFLOW DRAINS

- 1. General: Install drains in accordance with manufacturer's written instructions and in locations indicated.
- 2. Coordinate metal flashing work with work of roofing, waterproofing, and adjoining substrate work.
- 3. Coordinate with roofing as necessary to interface roof drains with roofing work.
- 4. Coordinate with storm water piping as necessary to interface drains with drainage piping systems.
- 5. Install drains at low points of surface areas to be drained.
- 6. Install drains flashing collar or flange so that no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
- 7. Position drains so that they are accessible and easy to maintain.
- 8. Set overflow drains at proper elevation relative to main roof drains.

- J. HOSE BIBBS (INSIDE)
  - 1. Install on exposed piping where indicated, with vacuum breaker.
- K. HOSE BIBBS AND HYDRANTS
  - 1. Install where indicated, with vacuum breaker and in accordance with manufacturer's installation instructions.
- L. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to drinking fountains, lavatories, sinks, urinals, and water closets.
- M. Water Hammer Arrestors (Shock Absorbers): Locate shock absorbers in supply pipe in accordance with recommendations of Plumbing and Drainage Institute PDI WH201. Install ahead of solenoid operated valves. Determine size of absorber by fixture unit value of fixture supplied, using PDI symbols to designate sizes. Provide access panel for each shock absorber.

**END OF SECTION 22 10 06**

**SECTION 22 30 00 - PLUMBING EQUIPMENT**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Water Heaters:
  - 1. Commercial electric.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

**1.3 REFERENCE STANDARDS**

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Current Edition, Including All Revisions.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data:
  - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
  - 2. Indicate pump type, capacity, power requirements.
  - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
  - 4. Provide electrical characteristics and connection requirements.
- C. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- C. Water Heaters:
  - 1. Water heaters and storage tanks to meet current energy efficiency code requirements and be provided with anode rod corrosion protection, internal glass lining, insulated steel jacket with baked enamel finish, and pressure-temperature relief valve to match tank working pressure. Rate water heaters at 150 PSIG working pressure; rate storage tanks at 125 PSI working pressure. Refer to schedule on Drawings for capacity and model.
  - 2. ANSI Compliance: Comply with NFPA 58 "Liquefied Petroleum Gas Code," as applicable to installation of LP-fired appliances.
  - 3. CSA and NSF Labels: Provide water heaters which have been listed and labeled by CSA and NSF.
  - 4. ASME Code Symbol Stamps: For applicable equipment, comply with ASME Boiler and Pressure Vessel Code for construction, and stamp with ASME code symbol.
  - 5. ASME Relief Valve Stamps: Provide water heaters and water tanks with safety relief valves bearing ASME valve markings.
  - 6. Code Compliance: Comply with the UPC and ASHRAE 90.1-1999.
  - 7. PDI Compliance: Comply with applicable Plumbing and Drainage Institute Standards pertaining to factory fabricated water heaters.

1.6 CERTIFICATIONS

- A. Water Heaters: NSF approved.
- B. Electric Water Heaters: UL listed and labeled to UL 174 or UL 1453.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.1 See plan sheets for all plumbing equipment selections.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

**END OF SECTION 22 30 00**



**SECTION 22 40 00 - PLUMBING FIXTURES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Water closets.
- B. Urinals.
- C. Lavatories.
- D. Sinks.
- E. Service sinks.
- F. Drinking fountains.
- G. Hose Bibbs and Wall Hydrants
- H. Fixtures:
  - 1. Plumbing fixtures and trim, including rims for sinks and lavatories in casework or counters, chair carriers (as required), drinking fountains, drains, cleanouts, floor sinks, and related fixtures shown on the Drawings.
  - 2. Rough and final connection to equipment and fixtures, relocated or provided under other sections by Owner and under other divisions of the work.
  - 3. Standards and supports for equipment requiring them.
  - 4. Instructions and maintenance manuals for equipment furnished by this Section.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 22 10 05 - Plumbing Piping.
- C. Section 22 10 06 - Plumbing Piping Specialties.

**1.3 REFERENCE STANDARDS**

- A. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 2002.
- B. ASME A112.18.1 - Plumbing Supply Fittings; 2018.
- C. NSF 61 - Drinking Water System Components - Health Effects; 2018.
- D. NSF 372 - Drinking Water System Components - Lead Content; 2011.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Instructions: Indicate installation methods and procedures.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Manufacturers: Firms regularly engaged in manufacture of plumbing system products, of types, materials, and sizes required.
- C. Regulatory Requirements:
  - 1. Codes: Comply with UPC pertaining to plumbing materials, construction and installation of products. Comply with local and state regulations.

2. ANSI Compliance: Comply with applicable American National Institute standards pertaining to products and installation.
3. PDI Compliance: Comply with applicable Plumbing and Drainage Institute standards pertaining to products and installation.
4. Federal Standards: Comply with applicable Federal Specification WW-P-541 Series sections pertaining to plumbing fixtures.
5. NAHB Label: Provide fiberglass bathtub units and shower stalls which have been tested and labeled by NAHB Research Foundation.
6. ADA Compliance: Construct and install barrier-free plumbing fixtures in accordance with "The Americans with Disabilities" Act.
7. UL and NEMA Compliance: Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by UL and which comply with NEMA standards.
8. CEC Compliance: Comply with CEC as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.

#### 1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

#### 1.8 WARRANTY

- A. See Section 01 78 00 – Closeout Submittals, for additional warranty requirements.

### PART 2 PRODUCTS

#### 2.1 GENERAL

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

#### 2.2 GENERAL REQUIREMENTS:

- A. Refer to Architectural drawings for exact locations, fixture mounting heights and ADA accessibility requirements.
- B. Insulate domestic hot water, tempered water and waste piping below accessible plumbing fixtures with molded single piece removable insulation covers, foam, fire resistant, Truebro, or equal. Install insulation covers in accordance with ADA requirements.
- C. Provide 85% IPS red brass pipe for each connection to faucets, stops, hose bibs, and other fixtures/trim. Securely anchor brass pipe to structure. Install stop valves on water supply lines for each fixture, except hose bibbs.
- D. Provide compression shutoff control stop valves with IPS inlets and threaded brass nipples at pipe connection on water supplies to each fixture. Provide stops with lock shield loose key and key handle for each stop. For combination fixtures, provide with compression stop and IPS inlet on each water supply fitting.
- E. Provide cast brass escutcheons, except escutcheons exposed to view shall have chrome plated finish.
- F. Provide chromium-plated finish on fittings and accessories exposed to view.
- G. Fixture fittings and trim: Conform to ASME A112.18.1M and ASME A112.19.5, as applicable.
- H. Centerset faucets: Top-mounted with inlets on not greater than 4-inch centers, unless specified otherwise below.
- I. Separate faucets and combination supply fittings: Provide inlets on 8-inch centers.

- J. Zinc-alloy or plastic handles are not permitted for faucets and valves.
- K. Provide special roughing-in for wheelchair fixtures.
- L. Provide water hammer arrestors at end of pipe runs to two or more fixtures, properly sized with sufficient displacement volume to dissipate calculated energy in the piping systems. Water hammer arrestors shall be stainless steel shell with stainless steel bellows contained within the casing, Zurn Model Z-1700, or equal. See Section 22 10 06. Locate in accessible location or provide access panel with location approved by Architect.
- M. Fixture dimensions specified are nominal.

### 2.3 PLUMBING FIXTURES

- A. General: Provide factory fabricated fixtures of type, style and material indicated on the plumbing fixture schedule on the Drawings. For each type of fixture, provide fixture manufacturer's standard and recommended trim as necessary for a complete and finished installation. Third party vendor provided trim is acceptable where all applicable code and regulatory requirements are met.
  - 1. Fixtures: Complete with fittings, supports, fastening devices, faucets, valves, traps, stops and appurtenances required.
  - 2. Exposed IPS Piping and Tubing: Brass, chrome plated.
  - 3. Escutcheons: Brass, chrome plated.
  - 4. Fixture Locations: As shown on Drawings.
  - 5. Stops: Stops installed in each supply pipe at each fixture accessibly located with wall escutcheons.
  - 6. Public Lavatories: No outlet shall exceed 0.5 GPM.
  - 7. Interior Faucets Except Public Lavatories: As indicated on Drawings.

### 2.4 FIXTURE TRIM

- A. Traps: Provide traps on fixtures except fixtures with integral traps. Exposed traps chromium plated cast brass or 17-gauge chromium plated brass tubing. American Standard, Kohler, Chicago, BrassCraft, Eastman, Speedway, McGuire, or approved.
- B. Supplies and Stops: First quality, chrome plated with brass stems. Stops: Loose key type. American Standard, Kohler, Chicago, BrassCraft, Eastman, Legend, Speedway, McGuire, or approved.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

### 3.2 PROTECTION

- A. Protect fixtures and equipment from damage. Replace damaged items with new.
- B. Keep pipe openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect piping, ductwork, fixtures, equipment and apparatus against dirty water, chemical or plumbing damage both before and after installation. Restore to its original condition or replace fixtures, equipment or apparatus damaged prior to final acceptance of the work.
- C. Protect bright finished shafts, bearing housings and similar items, until in service; no rust will be permitted.
- D. Cover equipment and materials stored on the job site or otherwise suitably protect at the direction of, and to the satisfaction of Architect. If coverings become torn, replace until the equipment is connected and operating.

### 3.3 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

### 3.4 INSTALLATION - GENERAL

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 05, color to match fixture.
- F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

### 3.5 FIXTURES INSTALLATION

- A. General:
  - 1. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes.
  - 2. Verification of Conditions: Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures.
  - 3. Set and connect to soil, waste, vent and water piping in neat, finished and uniform manner. Connections to be equal height, plumb and set at right angles to floor, or both unless otherwise required or specified.
  - 4. Seal fixtures mounted on floors and walls at abutting joints with approved sealant compounds as directed by Architect.
  - 5. For ADA accessible toilets, provide with handle at wide portion of stall.
  - 6. Lavatories: Set mixing valves to limit outlet temperature to 110F.
- B. Fixture Locations: As shown on Drawings. Center water closets and urinals between privacy partitions unless noted otherwise.
- C. Stops: Stops installed in each supply pipe at each fixture accessibly located with stops of loose key type. Concealed stops to be screwdriver or loose key type with wall escutcheons.
- D. Fixture Supports:
  - 1. Support wall hung water closets, urinals and lavatories on heavy duty, full size, concealed, commercial grade chair carriers mounted to floor structure. Refer to plumbing fixture connection schedule on drawings.
  - 2. Support other fixtures mounted on stud partitions on heavy concealed wall brackets bolted to a 1/4-inch thick by 5-inch high steel plate anchored firmly to studs with bolts (or welded to metal studs). Plate to extend one stud each way beyond fixture mounting point width.
- E. Flush Valves: Provide "drop-ear" ells or couplings in wall at water supply outlets to flush valves; anchor firmly to structure. At ADA accessible fixtures, face handle to wide portion of stall.
- F. After fixtures are set in place and secured to walls, caulk around between fixtures and wall with white silicone caulking compound. Dow Corning 780, General Electric Construction Sealant, or approved.
- G. Set countertop lavatories and stainless-steel sink rims in waterproof sealant made for application.

- H. Adjust self-closing faucets to provide minimum of 10 seconds of waterflow, and maximum of 15 seconds.
- I. After fixture installation is complete, cover and protect rims, fronts and exposed parts until completion of construction phase. Contractor to be responsible for damage to fixtures and assumes related fixture repair or replacement costs.
- J. Adjusting and Cleaning: Clean plumbing fixtures, trim, and strainers of dirt and debris upon completion of installation. Adjust water pressure at drinking fountains, faucets, shower valves and flush valves to provide proper flow stream and specified GPM. Repair leaks at faucets and stops.
- K. Extra Stock: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner.
- L. Field Quality Control:
  - 1. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
  - 2. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.
- M. Adjusting and Cleaning: Piping: Clean piping exterior surfaces. Comply with Section 22 07 19, Insulation, as applicable. Flush out water filled or drainage piping systems with clean water.

### 3.6 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

END OF SECTION

**SECTION 23 05 10 - MECHANICAL GENERAL PROVISIONS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. References.
- B. Description of Work.
- C. Drawings and Specifications.
- D. Industry Standards and Codes.
- E. Site Examination.
- F. Permits, Fees and Utility Connections.
- G. Coordination of Work.
- H. Progress of Work.
- I. Submittals
- J. Operation and Maintenance Manuals.
- K. Project Record Documents.
- L. Warranty.
- M. Quality and Care
- N. Access Doors.
- O. Starting Equipment and Systems.

1.2 RELATED SECTIONS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
- B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the mechanical systems.
- C. The requirements of this Section apply to all Work of Divisions 22 and 23.
- D. Section 01 30 00 – Administrative Requirements
- E. Section 01 40 00 - Quality Requirements.
- F. Section 01 70 00 – Execution and Closeout Requirements
- G. Section 01 78 00 – Closeout Submittals
- H. Section 01 79 00 – Demonstration and Training.

1.3 DEFINITIONS

- A. Following is a list of abbreviations generally used in Division 23:
  - 1. ADA Americans with Disabilities Act
  - 2. AHJ Authority Having Jurisdiction
  - 3. ANSI American National Standards Institute
  - 4. ARI Air-Conditioning & Refrigeration Institute
  - 5. ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
  - 6. ASME American Society of Mechanical Engineers
  - 7. ASTM American Society for Testing and Materials
  - 8. ASSE American Society of Sanitary Engineering
  - 9. AWWA American Water Works Association
  - 10. CBC California Building Code
  - 11. CEC California Electrical Code
  - 12. CMC California Mechanical Code
  - 13. CPC California Plumbing Code

14.	CGA	Canadian Gas Association
15.	CISPI	Cast Iron Soil Pipe Institute
16.	CSA	Canadian Standards Association
17.	ETL	Electric Testing Laboratories
18.	FM	FM Global
19.	HI	Hydraulic Institute Standards
20.	HVAC	Heating, Ventilating and Air Conditioning
21.	MSS	Manufacturers Standardization Society
22.	NEC	National Electric Code
23.	NEMA	National Electrical Manufacturers Association
24.	NFPA	National Fire Protection Association
25.	NFGC	National Fuel Gas Code
26.	NRCA	National Roofing Contractors Association
27.	NSF	National Sanitation Foundation.
28.	OSHA	Occupational Safety and Health Administration
29.	SMACNA Sheet Metal and Air Conditioning Contractors' National Association, Inc.	
30.	TEMA	Tubular Exchanger Manufacturers Association
31.	TIMA	Thermal Insulation Manufacturers Association
32.	UL	Underwriters Laboratories Inc.
33.	UPC	Uniform Plumbing Code

- B. Provide: To furnish and install, complete and ready for the intended use.
- C. Furnish: Supply and deliver to the project site, ready for unpacking, assembly and installation.
- D. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at the project site as required to complete items of work furnished by others.

#### 1.4 REFERENCES

- A. ANSI - American National Standards Institute.
- B. ASTM - American Society for Testing Materials.
- C. CEC - California Electric Code.
- D. NEMA - National Electric Manufacturers' Association.
- E. NFPA - National Fire Protection Association.
- F. OSHA - Occupational Safety and Health Act.
- G. UL - Underwriters' Laboratories.
- H. See detailed References that are listed in individual sections.

#### 1.5 DESCRIPTION OF WORK

- A. The work included in this division of the specifications consists of furnishing labor, tools, equipment, supplies and materials, unless otherwise specified, and in performing operations necessary for the installation of the complete Mechanical System as required by these specifications or shown on the Drawings, subject to the terms and conditions of the Contract Agreement.
- B. The work shall also include the completion of details of mechanical work not mentioned or shown which are necessary for the successful operation of mechanical systems described on the drawings or required by these specifications. Furnish and install any incidental work not shown or specified which is required to provide a complete and operational system.

#### 1.6 DRAWINGS AND SPECIFICATIONS

- A. A. Where Contract Documents are at variance with applicable codes governing work, code and local jurisdiction requirements take precedence, and include cost necessary for code compliance or local jurisdiction compliance in bid price. Machinery and equipment to comply

with Occupational Safety and Health Act of 1970, as currently revised, as interpreted for equipment manufacturer requirements.

- B. Drawings are schematic and diagrammatic. Drawings indicate the general arrangement of equipment, piping, ductwork and other mechanical work. Drawings are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., ducts and piping) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than basis of design, including but not limited to architectural, structural, electrical, HVAC, fire sprinkler, and plumbing. Use judgement and care to install mechanical work to fit the job conditions within the building construction and finishes, and to function properly.
- C. The Contractor shall investigate the building conditions affecting the Work and shall arrange his work accordingly providing offsets, fittings, valves and accessories to fit the actual job conditions. The Contractor shall be responsible to field measure and confirm new and existing mechanical systems locations with respect to other architectural, structural, and electrical work, existing and new. Do not scale distances off of the mechanical drawings. Use actual building dimensions.
- D. The drawings and specifications are complimentary each to the other. What is required by one shall be as binding as if called for by both.
- E. Examine all drawings and specifications prior to bidding the Work. Report any discrepancies to the Engineer.

#### 1.7 INDUSTRY STANDARDS AND CODES

- A. The Mechanical Contractor shall comply with the latest provisions of all codes, regulations, laws and ordinances applicable to the work involved. This does not relieve the Contractor from furnishing and installing work shown or specified which may exceed the requirements of such codes, regulations laws and ordinances.
- B. All materials, products, devices, fixtures forms or types of construction included in this project shall meet or exceed the published requirements of the publications listed below. These publications form a part of this specification.
  - 1. California Building Code, 2022.
  - 2. California Mechanical Code, 2022.
  - 3. California Plumbing Code, 2022.
  - 4. California Electrical Code, 2022.
  - 5. National Fire Protection Association.
  - 6. California Fire Code, 2022.
  - 7. California State Fire Marshal.
  - 8. Occupational Safety and Health Administration, including CAL-OSHA.
  - 9. State of California Energy Conservation Standards.
  - 10. State of California Code of Regulations, Title 24.
  - 11. Other applicable state laws.
- C. Nothing in the Drawings or Specifications shall be construed to permit work that does not conform these codes. When Contract Documents differ from governing codes, furnish and install to the higher standard required at no extra charge. The Contract Documents are not intended to repeat the code requirements except where necessary for clarity.
- D. No material or product installed as a part of the Work shall contain asbestos in any form.

#### 1.8 SITE EXAMINATION

- A. Contractor shall examine the site, verify dimensions and locations with Drawings, check utility connection locations, and familiarize himself with the existing conditions and limitations. No extras will be allowed because of the Contractor's misunderstanding of the amount of work involved or his lack of knowledge of any site condition which may affect his work. Any apparent



variance of the drawings or specifications from the existing conditions at the site shall be called to the attention of the Engineer immediately.

**1.9 PERMITS, FEES AND UTILITY SERVICES**

- A. Contractor shall pay for and obtain all permits and service required in the installation of this work.
- B. Contractor shall arrange for all required inspections and will secure approvals from authorities having jurisdiction.

**1.10 COORDINATION OF WORK**

- A. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work and that such establishment is the exclusive responsibility of the contractor.
- B. The Contractor shall give careful consideration to the work of the General, Electrical and other contractors on the job and shall organize his work so that it will not interfere with the work of other trades. He shall consult the drawings and specifications for work of other trades for correcting information, and the pertinent drawings for details and dimensions. Install this work in harmony with other crafts and at proper time to avoid delay of work.
- C. Arrange mechanical work in a neat, well-organized manner with the piping, ductwork and similar services running parallel and/or perpendicular to primary lines of the building construction. Locate operating and control equipment properly to provide easy access, and arrange entire mechanical work with adequate access for operation and maintenance.
- D. Verify the location of all equipment, air distribution devices, etc. and if interference develops, the Owner/Engineer's decision will be final and no additional compensation will be allowed for the moving of misplaced air devices or equipment.
- E. Execute any work or apparatus shown on the drawings and not mentioned in the specifications, or vice versa, the same as specifically mention by both. Omission from drawings or specifications of any minor details of construction, installation, materials, or essential specialties does not relieve this contractor from furnishing same in place complete.
- F. Furnish and install any incidental work not shown or specified which can reasonably be inferred as part of the work and necessary to provide a complete and workable system.
- G. Furnish materials and work at proper time to avoid delay of the work.

**1.11 PROGRESS OF WORK**

- A. This Contractor shall organize his work so that the progress of the mechanical work will conform to the progress of the other trades, and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from defective or ill timed work performed under this section shall be borne by this Contractor.

**1.12 EXISTING SOILS CONDITIONS**

- A. Understand existing soils conditions before submitting bid on work. No additional allowance will be granted due to lack of information for existing conditions of subsurface soils.
- B. Submission of a bid will be considered acknowledgment of review/understanding of project geotechnical soils report.

**1.13 STRUCTURAL DESIGN REQUIREMENTS AND SEISMIC RESTRAINTS**

- A. Mechanical systems and equipment shall be anchored and, as applicable, seismically braced in accordance with all applicable codes and industry standards.
- B. Where required, the Contractor shall design seismic bracing for all mechanical equipment and systems to comply with the 2022 California Building Code (CBC) and the latest edition of the Mason Industries "Seismic Restraint Guidelines".
  - 1. Contractor shall submit details and calculations prepared and signed by a licensed professional structural engineer registered in the state in which the Work is performed demonstrating compliance with the above and all applicable codes.

2. Drawings, details and calculations shall be submitted to the Engineer for review. Compliance documents shall be approved by the Engineer prior to installation.
- C. Mechanical systems and equipment shall include, but are not limited to, all ductwork, piping, air conditioning equipment, heating and ventilating equipment, air handlers, fans, electrical and control panels, conduits and other components installed under the scope of work described in the mechanical drawing sheets.
- D. Supports, anchorage and restraints for all piping and ductwork for standard installation details that comply with the latest edition of the latest edition of the Mason Industries "Seismic Restraint Guidelines", or equal, shall be used wherever possible. The Contractor shall provide all supporting documentation required for the Engineer and the reviewing authorities. If compliance with one of these standards is demonstrated, separate structural calculations are not required.
- E. For all non-standard installations not detailed in one of the approved systems, the Contractor shall provide details of supports, anchorages and restraints with supporting calculations all stamped and signed by a licensed professional structural engineer registered in the state in which the Work is performed.

#### 1.14 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements, for additional submittal procedures.
- B. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
  1. Submit within 15 days after date of Notice to Proceed.
  2. For products specified only by reference standards, list applicable reference standards.
- C. 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.
- D. Shop Drawing Submittals: Prepared specifically for this Project.
- E. Organize submittals in sequence according to Specification Section. Submit in bound document with tabs identifying each Specification Section. Provide a Table of Contents identifying the Specifications Sections being submitted and the contents within each tabbed section. Prepare Submittals in multiple volumes if required. Provide a complete Submittal package at one time. Do not submit individual Sections piecemeal.
- 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.
- G. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- H. Furnish, upon request, installation instructions for all equipment and materials to Inspector of Record prior to installation.
- I. Maintain a copy of the fire and smoke damper installation instructions on site for use by the Inspector of Record.

#### 1.15 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Architect will consider requests for substitutions only per the requirements and procedures indicated in the general and special conditions of these specifications.
- C. Substitutions will not be considered when a product becomes unavailable through fault of the Contractor.

- D. Failure by the Contractor to order materials or equipment in a timely manner will not constitute justification for a substitution.
- E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- F. A request for substitution constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse Owner and Architect for review or redesign services associated with reapproval by authorities including obtaining reapproval by authorities.
- G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- H. If excessive review, as judged by the Engineer, is required caused by complicated, numerous or repetitive requests, Contractor shall reimburse Engineer and its Consultants for such review at their standard billing rates.
- I. Substitution Submittal Procedure:
  - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
  - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  - 3. The Architect will notify Contractor in writing of decision to accept or reject request.
  - 4. Present each substitution individually. If a proposed substitute is not found to be acceptable, then the specified item shall be supplied.

#### 1.16 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01 78 00 Closeout Submittals for Operation and Maintenance Data requirements.
- B. Provide operating and maintenance instructions, diagrams and parts lists for all components of all mechanical systems and each piece of equipment furnished under these specifications.
- C. Operating and maintenance instructions shall be furnished for the following equipment and systems:
  - 1. Ventilating Systems.
  - 2. Air Conditioning Systems.
  - 3. Temperature Controls Systems.
  - 4. Motors.
  - 5. Air Balance and Test Reports.
- D. Provide manufacturer's model number, design data, capacities, etc. for each piece of mechanical equipment furnished as a part of the Work.
- E. The operating instructions shall include procedures for starting, stopping and emergency manual operation for all equipment and systems.
- F. Provide maintenance instructions of each item of individual equipment including applicable maintenance data as recommended by the manufacturer, including frequency of lubrication, lubricants, inspections required, adjustment procedures, belt and pulley sizes, etc.
- G. Provide manufacturer's parts bulletins with part numbers for each item of equipment included in the Work. Parts bulletins shall be specific to the equipment provided. Extraneous information that does not apply to the equipment provided shall be eliminated from the literature.

- H. Include copies of test reports (startup, check, etc.) and inspections performed for each piece of equipment provided in the Work.
- I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- J. Provide supplier and manufacturer contacts, telephone numbers and addresses in the front portion of the operation and maintenance manual.

**1.17 PROJECT MODIFICATIONS**

- A. During the progress of construction, if such conditions arise that require revisions, modifications, or relocations to any mechanical equipment or materials incorporated in this project, such alterations shall be immediately called to the attention of the Architect. Contractor shall then prepare necessary drawings showing proposed changes. Submit proposed changes for review by the Architect prior to actual revision work in the field.
- B. Two sets of drawings showing all revisions shall be immediately presented to the Architect for his records. Maintain additional copies on the project as necessary to comply with "RECORD DRAWINGS" requirement of the General Requirements.
- C. Incorporate all revisions into record drawings.

**1.18 PROJECT RECORD DOCUMENTS**

- A. See Section 01 78 00 – Closeout Submittals for Project Record Document requirements.
- B. Record Drawings:
  - 1. Show changes and deviations from the Drawings. Include issued Addendum and change order items.
  - 2. Make changes to the Drawings in a neat, clean, and legible manner.

**1.19 QUALITY ASSURANCE**

- 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, 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.
- H. Permits and Inspections:
  - 1. Unless otherwise distinctly hereinafter specified, apply and pay for necessary permits, plans check, and inspections required by public AHJ.
  - 2. Refer to General and Supplementary Conditions for payment of water and sewer service connection fees.
  - 3. Obtain certificates of inspection from AHJs and deliver to Owner before final acceptance.
  - 4. Each trade to consult local building department and utility companies prior to commencement of work to ascertain existence and location of existing underground utilities. Protect existing service against damage and interruption of use, and reroute as may be necessary to accomplish new work. Include costs for materials and installation for rerouting as specified for new work in bid price.
- I. Regulatory Requirements:
  - 1. UL and CSA Compliance: Provide units which are UL and CSA listed.

2. ASME Compliance: Provide units which are ASME listed when water heaters and boilers which exceed 200,000 BTUH, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by code or local jurisdiction.

#### 1.20 WARRANTY

- A. See Section 01 78 00 Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a one-year period after Date of Substantial Completion.

### PART 2 PRODUCTS

#### 2.1 QUALITY AND CARE

- A. All materials shall be new and in perfect condition when installed unless specifically indicated otherwise. Materials shall be tested within the Continental United States by an independent, nationally recognized testing agency and shall be listed in accordance with testing agency requirements. Materials are to be UL or CSA approved or acceptable by state, county, and city authorities. Equipment supplier is responsible for obtaining state, county, and city acceptance on equipment not UL approved or not listed for installation. When not otherwise specified, all material shall conform to applicable National Standards (ANSI).
- B. HAZARDOUS MATERIALS
  1. Do not use products containing asbestos, lead, arsenic, or any other material defined by EPA as hazardous to human or animal life.
- C. All capacities, sizes and efficiency ratings shown on the drawing are minimum. Gas meter and gas pressure reducing valve capacities are maximum allowable.
- D. Each category of material or equipment shall be of the same brand or manufacturer throughout the Work wherever possible.
- E. The quality of materials and equipment to be provided is defined by the brand names, manufacturers, model and catalog numbers listed on the Drawings and in the Specifications. Contractor shall provide each item listed, of the quality specified, or equal. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.
- F. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in applicable Installation and Maintenance Manuals.
- G. Inspect and report concealed damage to carrier within their required time period.
- H. Store materials in a clean, dry space. Maintain factory protection and/or provide an additional heavy canvas or heavy plastic cover to protect from dirt, water, construction debris, and traffic.
- I. Equipment which has been damaged, exposed to weather or is, in the opinion of the Engineer or Owner, otherwise unsuitable because of improper fabrication, storage or installation shall be removed and replaced by this Contractor at his expense.

#### 2.2 ACCESS DOORS

- A. Coordinate access door requirements with Section 08 31 13. The more stringent requirements shall govern.
- B. Provide access doors where access through floors, walls or ceilings is required to access mechanical, plumbing, control system components, fire dampers and fire alarm system components (such as smoke detectors, fire/smoke dampers, etc.) or other systems requiring access for maintenance, test or observation.
  1. Access doors requiring hand access or access for observation only shall be 14"x14" minimum usable opening.
  2. Access doors where passage of a service person may be required shall be 24"x30" minimum usable opening.
  3. In lieu of the requirements above, access doors of size and location recommended by the equipment manufacturer are acceptable.

- C. Established standard: Milcor of types listed below. Other acceptable manufacturers: Cesco, J.L. Industries, Karp, Larsen's, or equal. Comply with the following:
  - 1. Form doors and frames of welded, ground smooth steel construction, 14 gauge for doors, 16 gauge for frames. Provide prime coat finish except for stainless steel type.
  - 2. Concealed hinges to allow 175 degree opening.
  - 3. Locks: flush, screw driver operated cam lock(s).
  - 4. Provide anchoring devices suitable for the construction into which the doors are framed.
- D. Application (as applicable):
  - 1. In gypsum drywall walls and ceilings: Type DW.
  - 2. In ceramic tile walls: Type MS (stainless steel).
  - 3. In fire rated walls: Type Fire Rated (rating as required for wall or ceiling), self closing, 250 F in 30 min. temperature rating.

### **PART 3 EXECUTION**

#### **3.1 NOISE AND VIBRATION**

- A. Install vibration isolators, flexible connectors, expansion joints, and measures required to prevent noise and vibration from being transmitted to occupied areas. Select equipment to operate within noise coefficient (NC) design level for particular type of installation in relation to its location.
- B. After installation, make proper adjustments to reduce noise and vibration to acceptable levels as defined by Architect.

#### **3.2 SEISMIC CONTROL**

- A. Provide the following:
  - 1. General:
    - a. Earthquake resistant designs for mechanical equipment, i.e., air handling units, water heaters, blowers, motors, ductwork, mechanical and plumbing piping, to conform to regulations of CBC.
    - b. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment piping, ductwork, and the like, to withstand a force in direction equal to value defined in CBC.
    - c. Retain licensed structural engineer to provide shop drawings of seismic bracing and seismic movement assemblies for piping/ ductwork/ equipment/ water heaters, and the like. Engineer to design and provide stamped shop drawings for equipment, ductwork, water heaters, piping seismic bracing, and the like. Submit shop drawings along with equipment submittals.
    - d. Retain licensed structural engineer to provide shop drawings of seismic flexible joints for piping/ductwork and the like crossing building expansion or seismic joints. Engineer to design and provide stamped shop drawings for piping/ductwork flexible seismic joints. Coordinate actual design deflection or travel with project structural engineer. Submit shop drawings along with seismic bracing details. Coordinate exact design requirements from project structural engineer.
  - 2. Piping and Ductwork:
    - a. Use "Seismic Restraints Manual Guidelines for Mechanical Systems," published by SMACNA.
    - b. Sway bracing is not required for pipes that are installed on very short individual hangers (12 inch or less).
    - c. As approved by code authority, use a bracing system manufactured by Tolco, Superstrut, Mason, or Pipe Shields Inc. or approved.
  - 3. Equipment:

- a. Provide a means to prohibit excessive motion of mechanical equipment during earthquake.
- b. Provide mechanical equipment, both hanging and base mounted, with mounting connection points of sufficient strength to resist lateral seismic forces equal to 0.5 of equipment operating weight.

### 3.3 REVIEW BY ENGINEER

- A. Notify Architect/Engineer, in writing, at following stages of construction so that Architect/Engineer may, at their option, visit site for review and construction observation:
  1. Plumbing:
    - a. Underground piping installation prior to backfilling.
    - b. Prior to covering walls.
    - c. When ceiling installation is started.
    - d. When main systems, or portions of, are being tested and ready for inspection by AHJ.
  2. HVAC:
    - a. When ductwork installation starts.
    - b. When installation starts for each different major type of equipment.
    - c. When ceiling installation is started.
    - d. When lines or ducts are to be permanently concealed by construction or insulation systems.
    - e. When balancing and testing is started.

### 3.4 MUTILATION

- A. Repair mutilation of building around pipes, ducts, fixtures, and the like.

### 3.5 EQUIPMENT SELECTION AND SERVICEABILITY

- A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.
- B. Maintain design intent where equipment other than as shown in Contract Documents is provided. Where equipment requires piping arrangement, control diagrams, or sequencing different from that indicated in Contract Documents, provide electrical motors, wiring, controls, or other required electrical components at no additional cost to Owner.

### 3.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials and equipment in a manner to prevent damage and deterioration. Store in original container which identifies manufacturer's name, brand and model number. Do not store indoor equipment outdoors unless provided with a waterproof protective cover.
- B. Replacement: In event of damage, immediately make repairs and replacements necessary.

### 3.7 CLEANING

- A. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated by this work.

### 3.8 INSTALLATION

- A. A. Install equipment and fixtures in accordance with manufacturer's installation instructions, plumb and level, firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.
- B. Access Doors
  1. Coordinate the exact location of access doors to provide proper access to the item concealed. Obtain written approval for access door locations from Architect.
  2. Coordinate installation of access doors with the trades performing the construction assemblies into which the access doors are placed.
  3. Install all access doors neatly and securely, to open and close completely, and to operate freely and without binding. Install rated doors in accordance with their listing requirements.

4. Test operate all doors and make all adjustments required for satisfactory operation. Replace all damaged materials.
5. Install in accordance with manufacturer's instructions.

**3.9 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with the requirements within this section.
- B. Test all piping with no leak or loss in pressure in accordance with the requirements within this section.

**3.10 TESTING AND INSPECTION**

- A. See individual specification sections for additional testing and inspection required.
- B. Testing Agency Duties:
  1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  2. Perform specified sampling and testing of products in accordance with specified standards.
  3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
  5. Perform additional tests and inspections required by Architect.
  6. Submit reports of all tests/inspections specified.
- C. 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.
- D. Contractor Responsibilities:
  1. Deliver to agency at designated location, adequate samples of materials proposed to be used which 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.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

**3.11 GENERAL TESTING REQUIREMENTS FOR MECHANICAL AND PLUMBING SYSTEMS**

- A. Contractor shall assign a responsible person to be an independent representative to witness testing and to sign as witness of times, pressure and losses of testing media for all hydronic, duct and gas piping testing.
  1. Test all piping as noted below with no leak or loss of pressure. Repair or replace defective piping until tests are accomplished successfully.



2. Submit to the Engineer for review a log of all tests made which shall include time, temperature, pressure, water makeup and other applicable readings, necessary to indicate the systems have been operated and tested in the manner outlined in the construction documents.
  3. After producing the specified test pressure, disconnect the pressurizing source; do not introduce further pressure for the duration of the test period, repair leaky piping and retest. Repeat the procedure until the entire system is proven tight.
- B. Test the following systems with the medium listed to the pressure indicated for the time period listed:
1. Refrigerant Liquid: Pressure=300 Psig. / Medium=Dry Nitrogen / Duration=4 Hours.
  2. Refrigerant Suction: Pressure=150 Psig. / Medium=Dry Nitrogen / Duration=4 Hours.

### 3.12 CUTTING AND PATCHING

- A. Submit written request in advance of cutting or alteration which affects:
1. Structural integrity of any element of Project.
  2. Integrity of weather exposed or moisture resistant element.
  3. Efficiency, maintenance, or safety of any operational element.
  4. Visual qualities of sight exposed elements.
  5. Work of Owner or separate Contractor.
- B. Execute cutting and patching to complete the work, to uncover work to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit Products together to integrate with other work.
- C. Execute work by methods to avoid damage to other work, and which 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 air tight 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 Code requirements, to full thickness of the penetrated element.
- I. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

### 3.13 PRIMING AND PAINTING

- A. Apply primer to all exposed ferrous metals that are not factory primed, factory finished, galvanized, stainless steel or anodized. Exposed black steel piping shall be primed and finish painted.
1. Primer shall be as recommended by the paint manufacturer for each specific application.
  2. Acceptable Products include: Rust-Oleum product, or equal. See Section 09 90 00 for other acceptable products.
- B. Apply two coats of primer to metal surfaces of items to be insulated or jacketed, except ductwork and piping, or factory primed or finished.
- C. Preparation:
1. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.

2. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; seal stains and marks which cannot be completely removed using Devoe KILSTAIN primers, shellac, or other coating acceptable to paint manufacturer any marks or defects that might bleed through paint finishes.
  3. Remove or protect hardware, electrical plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings which are adjacent to surfaces to receive coatings.
  4. Remove mildew from impervious surfaces by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow substrate to thoroughly dry.
  5. Galvanized Surfaces:
    - a. Remove surface contamination and oils by solvent cleaning in accordance with SSPC-SP 1 and allow to dry.
    - b. Apply Devoe MIRROLAC Galvanized Metal Primer in accordance with manufacturer instructions.
  6. Uncoated Steel And Iron Surfaces:
    - a. Remove grease, rust, scale, and dust from steel and iron surfaces using solvent in accordance with SSPC-SP 1.
    - b. Where heavy coatings of scale or contaminants are evident, hand tool clean in accordance with SSPC-SP 2 or use other approved SSPC SP method as needed.
  7. Shop Primed Steel Surfaces: Remove loose primer and dust. Sand and feather edges to smooth surface. Clean areas with solvent and spot prime bare metal surfaces with appropriate Devoe MIRROLAC metal primer or primer recommended by manufacturer.
- D. Application:
1. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.
  2. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
  3. Remove dust and other foreign materials from substrate immediately prior to applying each coat.
- E. Finish Painting: See Section 09 90 00.
- 3.14 STARTING EQUIPMENT AND SYSTEMS/COMMISSIONING
- A. For commissioning requirements see Section 01 91 00.
  - B. Start equipment and systems in accordance with manufacturer's written instructions.
  - C. Provide manufacturer's field representative to prepare and start equipment and systems.
  - D. Adjust for proper operation within manufacturer's published tolerances.
  - E. Demonstrate proper operation of equipment to Owner's designated representative.
  - F. Description:
    1. Comply with all startup of mechanical and electrical equipment systems as required in the various sections and herein.
    2. Coordinate all testing and startup procedures with all other trades so that all non-mechanical and non-electrical work is completed and operational so that the specified testing can be performed.
  - G. Preliminary Work:
    1. Prior to the startup, the Contractor shall ensure that the systems are ready to operate, and the following items have been completed and checked including but not limited to:
      - a. Proper motor and fan/pump rotation.
      - b. Flushing and cleaning of the system.
      - c. Wiring
      - d. Auxiliary connections

- e. Lubrication.
  - f. Venting.
  - g. Controls.
  - h. Installation of filters and strainers.
  - i. Setting of relief and safety valves.
2. All electrical testing must be completed and test results submitted before equipment startup to avoid power interruptions during mechanical equipment startup and testing.
  3. The Contractor shall submit at least 30 days in advance a schedule listing the date of completion of his work as it will be ready for equipment startup of Electrical/Mechanical equipment. This schedule shall include work on a system by system, floor by floor basis.
  4. Two weeks prior to the startup of any major equipment, the Contractor shall certify in writing that the systems will be complete and ready for startup. Completeness shall not only include physical installation of individual pieces of equipment, but all related elements of other crafts to make all equipment operate as a system.
    - a. The startup checklist will cover all related crafts, e.g., controls, electrical, mechanical, and a clean environment for equipment startup.
  5. The Contractor shall schedule a tour with the Owner's representative to review startup conditions prior to equipment startup. This tour does not relieve the Contractor of any responsibilities to properly start equipment. The Owner's representative will issue a notice of deficiencies that will be required to be corrected prior to equipment startup. The Contractor will be required to reschedule a back check with the Owner's representative prior to attempting an equipment startup.
  6. Equipment of systems should not be started until systems and associated subsystems are completed. Verify that other continuing work could not possibly damage completed systems if they are in operation. Furnish signed off prestartup check sheet.
- H. Startup and Commissioning:
1. System Startup and Operation:
    - a. The Contractor shall provide all labor, materials and services necessary for the initial startup and operation of all systems and equipment furnished and installed under this section.
    - b. The Contractor and the factory representative shall provide for the services of qualified factory representatives for all major equipment prestart setup, startup and initial operation. Such periods shall be sufficient to insure the proper operation of systems and equipment. Major equipment to include, but not limited to rooftop units, modular cooling units, temperature controls, fan systems, electrical systems, emergency power, fire alarm systems, and fire sprinkler, etc.
    - c. The Contractor shall check all equipment during initial startup to insure correct rotation, proper lubrication, adequate fluids or air flows, nonoverloading electrical characteristics, proper alignment and vibration isolation. Systems shall be checked for air and/or water flows throughout without blockages. Air handling systems shall be checked for proper damper connections and positions, aligned and adjusted belt drives, proper lubrication, temporary air filters installed, nonexcessive electrical characteristics and minimal vibration. Other miscellaneous equipment shall be started and operated as described above as applicable. Manufacturer's representative shall submit a preliminary written copy of equipment startup check sheet prior to leaving job site.
    - d. After initial startup and operation of systems, the Contractor shall submit a report, showing proper operation before commencement of the final "Operation Test".
    - e. During initial operation of the system and until substantial completion, qualified personnel shall be provided and designated for maintaining the equipment and systems in good running order. Items such as strainers, cleanouts, filter replacement, bearing lubrication, packing replacement, and other consumables shall be provided without cost to the Owner. Failure of equipment during this period due to lack of proper supervision is the responsibility of the Contractor and continued failures shall

be grounds for the Owner to provide such services with back charges to the Contractor. Submit written schedule of completed maintenance to the Engineer.

I. System Acceptance:

1. General: The system installation shall be complete and tested for proper operation prior to acceptance testing "Operation Test" for the Owners authorized representative. A letter shall be submitted to the Owner requesting system acceptance. This letter shall certify that all controls are installed and the software programs have been completely exercised for proper equipment operation. Acceptance testing shall commence at a mutually agreeable time within ten (10) calendar days of request. When the field test procedures have been demonstrated to the Owner's representative and pass, the system will be accepted. The warranty period may begin at this time.

J. Operation Test:

1. Provide all labor, equipment, and materials required to perform test.
2. The test shall occur after all major equipment startup and balance services have been performed as specified. The purpose is to demonstrate that individual pieces of equipment and all related elements operate as one complete system and not to identify incomplete or defective work.
3. All equipment is to be run in an automatic operating position and exercised for 72 hours to verify that they perform in accordance with the specified sequence of operation and designed operation logic.
4. The Engineer's representative shall be notified and may be present for the initiation of the test.
5. A log shall be prepared by the Contractor, to be submitted to the Engineer, of all tests including, but not limited to: time, temperatures, pressures, and other readings to prove all equipment is operating as specified.
6. All temperatures, pressures, status indication, etc., shall be verified by at least one other means of measurement or visual verification of condition.
7. Change set points and simulate conditions as directed to demonstrate:
  - a. Ability to control to new set point.
  - b. Interface between systems, fire alarm/fire sprinkler systems.
  - c. Proper sequence and operation.
  - d. Equipment safety systems and all automatic changeover/backup systems and alarms are functioning or will function.
8. If unsatisfactory performance or a system failure is experienced for any reason, the test shall be repeated until 72-hour consecutive hours are achieved. The Engineer's representative shall make all final decisions of a satisfactory test.

3.15 GUARANTEE

- A. Be responsible for work done and materials installed under these plans and specifications. Repair or replace, as may be necessary, any defective work, materials, or part which may show itself within one year of filing of Notice of Completion and be responsible for damage to other materials, furnishing, equipment, or premises caused by such defects during this period, if in the opinion of the Architect said defect is due to imperfection of material or workmanship. Provide all such work and materials at no cost to Owner.
- B. Be responsible for damage to any part of premises during guarantee period caused by leaks or breaks in work furnished and/or installed under this section.
- C. Replace refrigerant, lubricants, or gasses lost as result of defects, breaks, or leaks in work.

3.16 ACCEPTANCE

- A. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
  1. Testing and balancing reports.
  2. Cleaning.

3. System balancing and balancing logs.
4. Operating and Maintenance Manuals.
5. Training of operating personnel.
6. Record Drawings.
7. Guaranty certificates.
8. Start-up and test document.
9. Letter of conformance.

**3.17 LETTER OF CONFORMANCE**

- A. Provide letter and copies of extended warranties with a statement in letter that mechanical items were installed in accordance with manufacturer's recommendations. Include letter of conformance and warranties in operating and maintenance manuals.
- B. Warranties to begin at date of substantial completion.

**END OF SECTION 23 05 10**

**SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe markers.
- E. Ceiling tacks.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 09 91 00 – Painting and Finishing: Identification painting.

**1.3 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

**PART 2 PRODUCTS**

**2.1 IDENTIFICATION APPLICATIONS**

- A. Air Handling Units, Fan Coil Units: Nameplates.
- B. Air Terminal Units: Tags.
- C. Automatic Controls: Tags. Key to control schematic.
- D. Control Panels: Nameplates.
- E. Dampers: Ceiling tacks, where located above lay-in ceiling.
- F. Ductwork: Stenciled painting.
- G. Instrumentation: Tags.
- H. Major Control Components: Nameplates.
- I. Piping: Pipe markers.
- J. Thermostats: Nameplates.
- K. Access Doors (hard ceilings and walls) accessing actuators, equipment, dampers, duct detectors, smoke/fire dampers, etc.: Nameplates.

**2.2 MANUFACTURERS**

- A. Brady Corporation: [www.bradycorp.com](http://www.bradycorp.com).
- B. Seton Identification Products: [www.seton.com/aec](http://www.seton.com/aec).

**2.3 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.

2. Letter Height, Equipment, control panels: 1 inch.
3. Letter Height, Thermostats and small control components: 1/4 inch.
4. Background Color: Black.

#### 2.4 TAGS

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- B. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

#### 2.5 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
  1. Ductwork: Minimum 1-1/4 inch high letters.
- B. Stencil Paint: As specified in Section 09 91 23, semi-gloss enamel, colors conforming to ASME A13.1.

#### 2.6 PIPE MARKERS

- A. Color: Conform to ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Secure to pipe using two (2) bands of adhesive tape with flow arrows supplied by the manufacturer. Install securing bands completely around pipe and overlapped.

#### 2.7 CEILING TACKS

- A. Description: Steel with 7/8-inch diameter color coded head. Heads shall be engraved with designation of above ceiling equipment.

### PART 3 EXECUTION

#### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 91 00 for stencil painting.

#### 3.2 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 09 91 00.
- D. Identify air conditioning units and exhaust fans with plastic nameplates.
- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify thermostats relating to terminal boxes or valves with nameplates.
- G. Tag automatic controls, instruments, and relays. Key to control schematic.
- H. Identify piping, concealed or exposed, with plastic pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

**END OF SECTION 23 05 53**

**SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Testing, adjustment, and balancing of air systems.
- B. Commissioning activities.

**1.2 REFERENCE STANDARDS**

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- C. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.
- D. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.
- E. NEBB (TAB) - Procedural Standards for Testing Adjusting Balancing of Environmental Systems; 2005, Seventh Edition.

**1.3 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. Balancing methods employed shall be in accordance with one of the following:
  - 1. AABC National Standard for Total System Balance
  - 2. ACCA Manual B
  - 3. ASHRAE 111
  - 4. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
  - 5. SMACNA HVAC Systems Testing, Adjusting, and Balancing.
- D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
  - 1. Submit electronic copy to the Architect and, if applicable, the Commissioning Authority, within two weeks after completion of testing, adjusting, and balancing.
  - 2. Final report shall include set of reduced drawings with air outlets and equipment identified.
  - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
  - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
  - 5. Units of Measure: Report data in I-P (inch-pound) units only.
  - 6. Include the following on the title page of each report:
    - a. Name of Testing, Adjusting, and Balancing Agency.
    - b. Address of Testing, Adjusting, and Balancing Agency.
    - c. Project name.
    - d. Project location.
    - e. Project Architect.
    - f. Project altitude.
    - g. Report date.



PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
  - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
  - 2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
- B. Test and balance shall be performed by an independent test and balance agency.
- C. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- D. TAB Agency Qualifications:
  - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
  - 2. Certified by one of the following:
    - a. AABC, Associated Air Balance Council: [www.aabc.com](http://www.aabc.com); upon completion submit AABC National Performance Guaranty.
    - b. NEBB, National Environmental Balancing Bureau: [www.nebb.org](http://www.nebb.org).
- E. TAB Supervisor Qualifications: Certified by same organization as TAB agency.

3.2 TESTING, ADJUSTING, AND BALANCING AGENCIES

- A. RS Analysis.
- B. Raglen System Balance.
- C. Other certified per 3.1 D above.

3.3 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  - 1. Systems are started and operating in a safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.
  - 3. Proper thermal overload protection is in place for electrical equipment.
  - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  - 5. Duct systems are clean of debris.
  - 6. Fans are rotating correctly.
  - 7. Fire and volume dampers are in place and open.
  - 8. Air coil fins are cleaned and combed.
  - 9. Access doors are closed and duct end caps are in place.
  - 10. Air outlets are installed and connected.
  - 11. Duct system leakage is minimized.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

3.4 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

3.5 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

### 3.6 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
  - 1. Running log of events and issues.
  - 2. Discrepancies, deficient or uncompleted work by others.
  - 3. Contract interpretation requests.
  - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

### 3.7 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
- M. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

3.8 COMMISSIONING, to be completed where applicable per NRCC-CXR-E form on drawings.

- A. Perform prerequisites prior to starting commissioning activities.
- B. Fill out Prefunctional Checklists for:
  - 1. Air side systems.
- C. Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.
- D. Re-check minimum outdoor air intake flows and maximum and intermediate total airflow rates for 30 percent of the air handlers plus a random sample equivalent to 30 percent of the final TAB report data as directed by Commissioning Authority.
  - 1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
  - 2. Use the same test instruments as used in the original TAB work.
  - 3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
  - 4. For purposes of re-check, failure is defined as follows:
    - a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.
    - b. Minimum Outside Air Flow: Deviation of more than 20 percent of instrument reading; for inlet vane or VFD OSA compensation system using linear proportional control, deviation of more than 30 percent at intermediate supply flow.
    - c. Temperatures: Deviation of more than one degree F.
    - d. Air and Water Pressures: Deviation of more than 10 percent of full scale of test instrument reading.
    - e. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.
  - 5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.
- E. In the presence of the Commissioning Authority, verify that:
  - 1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
  - 2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
  - 3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.

3.9 SCOPE

- A. Test, adjust, and balance the following:
  - 1. Unit Air Conditioners.
  - 2. Air Coils.
  - 3. Terminal Heat Transfer Units.
  - 4. Air Handling Units.
  - 5. Fans.
  - 6. Air Filters.

7. Air Terminal Units.
8. Air Inlets and Outlets.

**3.10 MINIMUM DATA TO BE REPORTED**

- A. Electric Motors:
  1. Manufacturer.
  2. HP/BHP.
  3. Phase, voltage, amperage; nameplate, actual, no load.
  4. RPM.
  5. Service factor.
  6. Sheave Make/Size/Bore.
- B. V-Belt Drives:
  1. Identification/location.
  2. Required driven RPM.
  3. Driven sheave, diameter and RPM.
  4. Belt, size and quantity.
  5. Motor sheave diameter and RPM.
  6. Center to center distance, maximum, minimum, and actual.
- C. Cooling Coils:
  1. Identification/number.
  2. Location.
  3. Service.
  4. Manufacturer.
  5. Air flow, design and actual.
  6. Entering air DB temperature, design and actual.
  7. Entering air WB temperature, design and actual.
  8. Leaving air DB temperature, design and actual.
  9. Leaving air WB temperature, design and actual.
  10. Air pressure drop, design and actual.
- D. Heating Coils:
  1. Identification/number.
  2. Location.
  3. Service.
  4. Manufacturer.
  5. Air flow, design and actual.
  6. Entering air temperature, design and actual.
  7. Leaving air temperature, design and actual.
  8. Air pressure drop, design and actual.
- E. Air Moving Equipment:
  1. Location.
  2. Manufacturer.
  3. Model number.
  4. Serial number.
  5. Arrangement/Class/Discharge.
  6. Air flow, specified and actual.
  7. Return air flow, specified and actual.
  8. Outside air flow, specified and actual.
  9. Total static pressure (total external), specified and actual.
  10. Inlet pressure.
  11. Discharge pressure.
  12. Sheave Make/Size/Bore.
  13. Number of Belts/Make/Size.
  14. Fan RPM.

- F. Return Air/Outside Air:
  - 1. Identification/location.
  - 2. Design air flow.
  - 3. Actual air flow.
  - 4. Design return air flow.
  - 5. Actual return air flow.
  - 6. Design outside air flow.
  - 7. Actual outside air flow.
  - 8. Return air temperature.
  - 9. Outside air temperature.
  - 10. Required mixed air temperature.
  - 11. Actual mixed air temperature.
- G. Exhaust Fans:
  - 1. Location.
  - 2. Manufacturer.
  - 3. Model number.
  - 4. Serial number.
  - 5. Air flow, specified and actual.
  - 6. Total static pressure (total external), specified and actual.
  - 7. Inlet pressure.
  - 8. Discharge pressure.
  - 9. Sheave Make/Size/Bore.
  - 10. Number of Belts/Make/Size.
  - 11. Fan RPM.
- H. Duct Traverses:
  - 1. Duct size.
  - 2. Area.
  - 3. Design velocity.
  - 4. Design air flow.
  - 5. Test velocity.
  - 6. Test air flow.
  - 7. Duct static pressure.
  - 8. Air temperature.
  - 9. Air correction factor.
- I. Air Distribution Tests:
  - 1. Air terminal number.
  - 2. Room number/location.
  - 3. Terminal type.
  - 4. Terminal size.
  - 5. Area factor.
  - 6. Design velocity.
  - 7. Design air flow.
  - 8. Test (final) velocity.
  - 9. Test (final) air flow.
  - 10. Percent of design air flow.

END OF SECTION

**SECTION 23 07 13 - DUCT INSULATION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Duct insulation.
- B. Duct Liner.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

**1.3 REFERENCE STANDARDS**

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2018.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum 5 years of experience.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

**1.7 FIELD CONDITIONS**

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

**PART 2 PRODUCTS**

**2.1 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

## 2.2 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
  - 1. Owens-Corning Fiberglas; Model [All Service Faced Duct Wrap].
  - 2. Knauf Insulation: [www.knaufinsulation.com](http://www.knaufinsulation.com).
  - 3. Johns Manville: [www.jm.com](http://www.jm.com).
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
  - 1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
  - 2. Duct Application: 2" thick, 3/4 pound density.
  - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  - 2. Secure with pressure sensitive tape.

## 2.3 DUCT LINER

- A. Manufacturers:
  - 1. Knauf Insulation: [www.knaufinsulation.com](http://www.knaufinsulation.com).
  - 2. Johns Manville: [www.jm.com](http://www.jm.com).
  - 3. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
- B. Insulation: Incombustible glass fiber complying with ASTM C 1071; flexible blanket; impregnated surface and edges coated with acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21.
  - 1. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
  - 2. Density: 1-1/2 pcf.
  - 4. Service Temperature: Up to 250 degrees F.
  - 5. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
- C. Liner Fasteners: Galvanized steel, welded with integral head.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Insulated ducts conveying air below ambient temperature:
  - 1. Provide insulation with vapor barrier jackets.
  - 2. Finish with tape and vapor barrier jacket.
  - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
  - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. External Duct Insulation Application:
  - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
  - 2. Secure insulation without vapor barrier with staples, tape, or wires.
  - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging.
  - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
  - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- D. Duct and Plenum Liner Application:
  - 1. Adhere insulation with adhesive for 90 percent coverage.

2. Secure insulation with mechanical liner fasteners. Liner shall start within 3 inches of the upstream transverse edges of the liner and 3 inches from the longitudinal joints, and shall be spaced at a maximum of 12 inches on center around the perimeter of the duct (except that they shall be a maximum of 12 inches from a corner break). Elsewhere, they shall be a maximum of 18 inches on center, except that they shall not be placed more than 6 inches from a longitudinal joint of the liner or 12 inches from a corner break. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible for spacing.
3. Seal and smooth joints. Seal and coat transverse and longitudinal joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are outside dimensions and include consideration for liner thickness.

### 3.3 SCHEDULES

- A. Supply and Return Ducts: Insulate all unlined supply and return ducts, except ducts exposed in conditioned spaces.
- B. Exhaust Ducts: Install lining where shown on drawings.

**END OF SECTION 23 07 13**



**SECTION 23 07 19 - HVAC PIPING INSULATION**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.2 RELATED REQUIREMENTS

- A. Section 23 23 00 - Refrigerant Piping: Placement of inserts.

1.3 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- F. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2018.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.7 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
  - 1. Armacell LLC; [www.armacell.us](http://www.armacell.us).
  - 2. Owens Corning Flex Tubing.

- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
  - 1. 'K' value: ASTM C 177; 0.27 at 75 degrees F.
  - 2. Minimum Service Temperature: Minus 40 degrees F.
  - 3. Maximum Service Temperature: 220 degrees F.
  - 4. Maximum Moisture Absorption - Pipe Insulation: 3.5 percent, by weight, when tested in accordance with ASTM D 1056.
  - 5. Water Vapor Permeability: 0.20 perm-inches, when tested in accordance with ASTM E 96.
  - 6. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
  - 1. Manufacturers:
    - a. Armstrong Model 520.
    - b. Owens Corning Model 500.

### 2.3 JACKETS

- A. PVC Plastic.
  - 1. Manufacturers:
    - a. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  - 2. Jacket: One-piece molded type fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: 0 degrees F.
    - b. Maximum Service Temperature: 150 degrees F.
    - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
    - d. Thickness: 10 mil.
    - e. Connections: Brush on welding adhesive.
  - 3. Covering Adhesive Mastic: Compatible with insulation.
    - a. Compatible with insulation.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
  - 1. Thickness: 0.016 inch sheet.
  - 2. Finish: Embossed.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Insulated pipes conveying fluids below ambient temperature:
  - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
  - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

- F. Insulated pipes conveying fluids above ambient temperature:
    - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
    - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
  - G. Inserts and Shields:
    - 1. Application: Piping 1-1/2 inches diameter or larger.
    - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
    - 3. Insert location: Between support shield and piping and under the finish jacket.
    - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
    - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
  - H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
  - I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.
  - J. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
- 3.3 SCHEDULE
- A. See drawings for insulation thickness by system type.

**END OF SECTION 23 07 19**

**SECTION 23 08 00 - MECHANICAL COMMISSIONING REQUIREMENTS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The purpose of this section is to specify the Contractor's responsibilities and participation in the commissioning process relative to division 23.
- B. The commissioning process is primarily the responsibility of the Commissioning Authority, with support for start-up, testing, and commissioning the responsibility of the Contractors. The commissioning process does not relieve the Contractor from participation in the process or diminish the role and obligations to complete all portions of work in a satisfactory and fully operational manner.
- C. Work of Division 23 includes:
  - 1. Testing and start-up of the mechanical equipment.
  - 2. Assistance in functional testing to verify equipment/ system performance.
  - 3. Providing qualified personnel to assist in commissioning tests, including seasonal testing.
  - 4. Completion and endorsement of pre-functional test checklists provided by the Commissioning Authority to assure that Division 23 equipment and systems are fully operational and ready for functional testing.
  - 5. Providing equipment, materials, and labor necessary to correct deficiencies found during the commissioning process which fulfill contract and warranty requirements.
  - 6. Providing training for the systems specified in Division 23 with coordination of owner.

1.2 RELATED WORK

- A. All testing and start-up procedures and documentation requirements specified within Division 23.
- B. Section 01 91 00 – General Commissioning Requirements
- C. Section 26 08 00 – Electrical Commissioning
- D. Commissioning functional test procedures that require participation of the Contractors.
- E. Cooperate with the Commissioning Authority in the following manner:
  - 1. Allow sufficient time before final completion dates so that test and balance and commissioning testing can be accomplished.
  - 2. Provide labor and material to make corrections when required without undue delay.
  - 3. Put all heating, ventilating, and air conditioning systems and equipment into full operation and continue the operation of the same during each working day of commissioning.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Standard certified test equipment for commissioning shall be provided by the TAB Contractor.

- B. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist the Commissioning Authority in the commissioning process.

### **PART 3 - EXECUTION**

#### **3.1 WORK PRIOR TO COMMISSIONING**

- A. Complete all phases of work so the system can be started, tested, balanced, and otherwise commissioned. Division 23 has primary start-up responsibilities with obligations to complete systems, including all sub-systems so they are functional. This includes the complete installation of all equipment, materials, pipe, duct, wire, insulation, controls, etc., per the contract documents and related directives, clarifications, change orders, etc.
- B. The Commissioning Authority will develop a Commissioning Plan. Upon request of the Commissioning Authority, the Contractor shall provide assistance and consultation. The Commissioning Plan will be developed prior to completion of the installation. The Contractor is obligated to assist the Commissioning Authority in preparing the Commissioning Plan by providing all necessary information pertaining to the actual equipment and installation.
- C. Specific pre-commissioning responsibilities of Division 23 are as follows:
  - 1. Normal start-up services required to bring each system into a fully operational state. This includes motor rotational check, cleaning, filling, purging, control sequences of operation, leak testing, full-load and part-load performance, etc. The Commissioning Authority will not begin the commissioning process until each system is complete and documented, including normal contractor start-up.
  - 2. The Contractor shall perform pre-functional tests on the equipment and systems as noted in section 01 91 00 General Commissioning Requirements.
  - 3. Contractor start-up forms may be substituted for the pre-functional test forms with prior approval by the Commissioning Authority.
  - 4. Pre-functional test forms will be kept in the Contractors job trailer in a Commissioning Field Notebook provided by the Commissioning Authority.
  - 5. Factory start-up services will be provided for key equipment and systems specified in Division 23. The Contractor shall coordinate this work with the manufacturer and the Commissioning Authority.
  - 6. Functional testing is intended to begin upon completion of a system. Commissioning may proceed prior to the completion of systems and/or sub-systems, if expediting this work is in the best interests of the Owner. Commissioning activities and schedule will be coordinated with the Contractor. Start of commissioning before system completion will not relieve the Contractor from completing those systems as per the schedule.
- D. The Commissioning Online Folder will be used to identify and track all pertinent commissioning documentation required during the Installation phase. This Online Folder will be assembled by the Commissioning Authority and maintained by the Contractor. The Online Folder provides a central location for the Commissioning Authority to identify, copy and organize all pertinent information and will include the following format:
  - 1. Summary describing Online Folder contents and use.
  - 2. Copy of Commissioning Plan for contractor field reference.
  - 3. Listing of all specification documentation requirements listed by specification section, with sign off spots for appropriate contractors.
  - 4. Tabs for each specification section with copies of pre-functional test check sheets provided by coordination of subcontractors and Commissioning Authority for contractor completion and space

for related contractor-supplied documents.

5. Prior to functional testing the Commissioning Authority will use this book to verify that all appropriate contractors have completed their work and signed off that they have done so. Once the Commissioning Authority is satisfied that all components of a system are complete functional testing will begin.

### 3.2 PARTICIPATION IN COMMISSIONING

- A. Provide skilled technicians to start up and debug all systems within the division of work. These same technicians shall be made available to assist the Commissioning Authority in completing the commissioning program as it relates to each system and their technical specialty. Work schedules, time required for testing, etc., will be requested by the Commissioning Authority and coordinated by the Contractor. Contractor will ensure the qualified technician(s) are available and present during the agreed-upon schedules and of sufficient duration to complete the necessary tests, adjustments, and/or problem resolutions.
- B. The Commissioning Authority reserves the right to judge the appropriateness and qualifications of the technicians relative to each item of equipment, system, and/or sub-system. Qualifications of technicians include expert knowledge relative to the specific equipment involved, adequate documentation and tools to service/commission the equipment, and an attitude/willingness to work with the Commissioning Authority to get the job done. A liaison or intermediary between the Commissioning Authority and qualified factory representatives does not constitute the availability of a qualified technician for purposes of this work.

### 3.3 WORK TO RESOLVE DEFICIENCIES

- A. Maladjustments, misapplied equipment, and/or deficient performance under varying loads will result in a system that does not meet the original design intent. Correction of work will be completed under the direction of the Architect, with input from the Contractor, equipment supplier, and Commissioning Authority. Whereas all members will have input and the opportunity to discuss, debate, and work out problems, the Architect/Engineer of Record will have final jurisdiction on the necessary work to be done to achieve performance and or design intent.

### 3.4 ADDITIONAL COMMISSIONING

- A. Additional commissioning activities may be required after system adjustments, replacements, etc., are completed. The Contractor, suppliers, and Commissioning Authority shall include a reasonable reserve to complete this work as part of their standard contractual obligations.

### 3.5 SEASONAL COMMISSIONING AND OCCUPANCY VARIATIONS

- A. Seasonal commissioning pertains to testing under full-load conditions during peak heating and peak cooling seasons, as well as part-load conditions in the spring and fall. Initial commissioning will be done as soon as contract work is completed regardless of season. Subsequent commissioning may be undertaken at any time thereafter to ascertain adequate performance during the different seasons.
- B. All equipment and systems will be tested and commissioned in a peak season to observe full-load performance. Heating equipment will be tested during winter design extremes. Cooling equipment will be tested during summer design extremes, with a fully occupied building. The Contractor will be responsible to participate in the initial and the alternate peak season test of the systems required to demonstrate performance.
- C. Subsequent commissioning may be required under conditions of minimum and/or maximum occupancy or use. All equipment and systems affected by occupancy variations will be tested and commissioned at the minimum and peak loads to observe system performance. The Contractor will be responsible to

participate in the occupancy sensitive testing of systems to provide verification of adequate performance.

**3.6 TRAINING**

- A. The Contractor will be required to participate in the training of the Owner's engineering and maintenance staff for each mechanical system and the related components. Training may be conducted in a classroom setting, with system and component documentation, and suitable classroom training aids, or in the field with the specific equipment. The type of training will be per the Owner's option.
- B. Training will be conducted jointly with the equipment vendors, the Contractor and Owner's operations and maintenance representatives. The Contractor will be responsible for the generic training, as well as instructing the Owner's staff on the system peculiarities specific to this project.

**3.7 SYSTEMS DOCUMENTATION**

- A. Contract Documents to incorporate field changes and revisions to system designs to account for actual constructed configurations will be addressed as required in Division 1. All drawings should be red-lined on two sets. Division 23 as-built drawings should include updated architectural floor plans, and the individual mechanical systems in relation to actual building layout.
  - 1. Maintain as-built red-lines on the job site as required in Division 1.
  - 2. In addition to the stated requirements for operation and maintenance data, provide one copy of equipment technical literature, operation and maintenance literature, and shop drawings to the Commissioning Authority as soon as they are available. This requirement is for review of these documents prior to distribution of multiple copies for the Owner's final use.

END OF SECTION

**SECTION 23 23 00 - REFRIGERATION, PIPING AND ACCESSORIES**

**PART 1 - GENERAL**

**1.1 CONDITIONS OF THE CONTRACT**

- A. The Conditions of the Contract (General, Supplementary, and other Conditions) and General Requirements (Sections of Division 1) are hereby made a part of this Section.
- B. Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

**1.2 WORK INCLUDED**

- A. Extent of refrigeration piping is indicated on Drawings and provisions of this section, including schedules and equipment lists associated with either Drawings or this section.

**1.3 QUALITY ASSURANCE**

- A. Dimensions, sizes, and capacities shown are minimum and shall not be changed without permission of Architect.

**1.4 SUBMITTALS**

- A. **REQUIREMENTS:** Submit manufacturer's technical product data and installation instructions for refrigeration piping systems.

**PART 2 - MATERIALS**

**2.1 REFRIGERATION SYSTEM REQUIREMENTS**

- A. Furnish and install all interconnecting refrigeration piping as shown and/or required. Piping shall be run in accordance with equipment manufacturer's recommendations. Pipe sizes shall be as recommended by equipment manufacturer. Test all refrigeration piping for leaks with an electronic leak detector. Seal and flash all roof and wall penetrations. Provide plastic pipe shields between pipe and hanger. Pitch suction piping down in direction of flow.
- B. **REFRIGERANT PIPING:** Type L hard copper refrigerant tubing cleaned and capped with wrought copper solder joint fittings and couplings. All joints shall be brazed.
- C. All stop valves shall be Henry, or approved equal, bronze diaphragm, packless type, solder ends. Sight glass shall be Henry Dri-View or approved equal.
- D. Refrigerant suction piping exposed to weather shall be insulated with 3/4-inch thick Armstrong Armaflex foamed plastic pipe insulation. Fittings and valves shall be covered with segmented sections on the pipe insulation installed in accordance with manufacturer's published instructions. All joints between sections of insulation shall be sealed with Armstrong No. 520 adhesive. The exterior of all exposed insulation shall be given two brush coats of Armstrong "Finish".
- E. Insulate concealed refrigerant piping with 1/2-inch thick, 4-lb. nominal density glass fiber insulation.

**PART 3 - EXECUTION**

**3.1 INSTALLATION OF REFRIGERANT PIPING**

- A. The refrigeration system shall be vacuum pumped, proven tight, and then charged with refrigerant from factory-sealed containers. All piping shall be properly purged with dry nitrogen and completely evacuated, dehydrated, and positive pressure leak tested in accordance with manufacturer's recommendations. Compressor crankcases shall be filled with dehydrated, wax-free lubricating oil.
- B. Test all refrigeration piping with 25 inch vacuum. Test refrigeration suction piping at 150 psi with nitrogen. Test refrigeration liquid piping at minimum 300 psi or the refrigerant high-side operating pressure, whichever is greater, with nitrogen. Equipment installation instructions for test pressures supersede these requirements.

**END OF SECTION 23 23 00**



**SECTION 23 31 00 - HVAC DUCTS AND CASINGS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Metal ductwork.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 23 07 13 - Duct Insulation: External insulation.
- C. Section 23 33 00 - Air Duct Accessories.
- D. Section 23 37 00 - Air Outlets and Inlets.
- E. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

**1.3 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
- C. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

**1.4 PERFORMANCE REQUIREMENTS**

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

**1.5 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials.
- C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for 2 inch pressure class and higher systems. Provide 1/4"=1'-0" ductwork layout plans showing duct routing, offsets, fittings, duct accessories, fire/smoke dampers, hydronic piping, seismic bracing, etc. Shop drawings shall be fully coordinated with all other trades, including the building structure, finishes, fire sprinkler piping, plumbing piping, hydronic piping and electrical systems.
- D. Duct Leakage Testing: Ductwork shall be sealed and tested for air leakage in accordance with the 2022 California Energy Commission Non-Residential Compliance Manual.
- E. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following the 2022 California Energy Commission Non-Residential Compliance Manual and the SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.
- F. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

**1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 5 years of documented experience.

### 1.7 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

## PART 2 PRODUCTS

### 2.1 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to SMACNA (DCS) standards.

### 2.2 MATERIALS

- A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, oil canning, stains and discoloration, and other imperfections, including those which would impair painting.
- B. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- C. Round supply ductwork and fittings shall be spiral lockseam equal to "United McGill" Uni-Seal duct.
- D. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim, and angles for support of ductwork.
- E. Insulated Flexible Ducts:
  - 1. Flexible ducts shall be U.L. listed and shall comply with UMC Standard 6-1.
  - 2. Flexible ducts shall have a flame spread index of not more than 25 and a smoke-density index not exceeding 50 when tested as a composite material.
  - 3. The maximum length of flexible ductwork shall be 5 feet. Ductwork shall be extended to full length whenever possible without severe bends or kinks. Bends shall be made to maintain R/W equal to 1.5.
  - 4. Black polymer film supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
    - a. Pressure Rating: 4 inches WG positive pressure and 1 inch negative pressure.
    - b. Insulation shall be 1-1/2 inch thick fiberglass.
    - c. Maximum Velocity: 4000 fpm.
    - d. Temperature Range: -20 degrees F to 175 degrees F.
- F. Ducts: Galvanized steel, unless otherwise indicated.
- G. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

### 2.3 DUCTWORK FABRICATION

- A. Shop fabricate ductwork in 4-, 8-, 10-, or 12-foot lengths, unless otherwise indicated or required, to complete runs. Pre-assemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.
- B. Shop fabricate ductwork of gauges and reinforcement complying with SMACNA HVAC Duct Construction Standards, latest edition.
- C. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with enter-line radius equal to 1.5 times associated duct width and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers.
- D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division- 23 section "DUCT ACCESSORIES" for accessory requirements.
- E. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

- F. Round ductwork shall be spiral lockseam, 26 gauge minimum. Round ductwork exposed within occupied spaces shall be spiral lockseam, 20 gauge minimum.
- G. Ductwork exposed within occupied spaces shall be internally sealed to provide a clean exterior appearance.
- H. T's, bends, and elbows: Construct according to SMACNA (DCS).
- I. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- J. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- K. Fittings shall be spot welded and internally sealed.
- L. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard.
- M. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used. Do not use straight taps.
- N. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

#### 2.4 MISCELLANEOUS DUCTWORK MATERIALS

- A. Provide miscellaneous materials and products of types and sizes indicated, and where not otherwise indicated, provide requirements as listed in the latest SMACNA manuals, including proper connection of ductwork and equipment.
- B. Fittings: Unless otherwise shown on Drawings, following fittings shall be used: two-piece, die-stamped, 45-degree to 90-degree elbows for sizes up to 8 inches; five-piece, 90-degree elbows for sizes over 8 inches; conical tees; and conical laterals. All reducers shall be placed after a tap has been made on the duct main. Reducers shall be long-taper style.
- C. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.
- D. Duct Joints: Joint and seal prefabricated, factory-build ducts, fittings, and couplings in strict accordance with duct manufacturer's instructions. Install duct sealers, pop rivets or sheet metal screws and canvas and Arabol on each joint. Duct sealer shall be fire retardant. Sheet metal screw for joints shall be minimum #10 size galvanized.
- E. Duct Access: Provide access panel sections in prefabricated, factory-build ducts for access to fire dampers, control equipment, etc. as specified in Duct Accessories Section. Access panel size shall be duct diameter wide by duct diameter high for all ducts under 24 inches. Ducts over 24 inches in diameter shall have 24-inch by 18-inch access panels. Minimum size access panels shall be 6 inches by 6 inches.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are outside dimensions. For lined ducts, duct sizes have been increased to account for lining.
- E. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- F. Assemble and install ductwork in accordance with recognized industry practices, which will achieve air tight (leakage class 12 for 2-inch pressure class) and noiseless (no objectionable noise) systems capable of performing each indicated service. Install each run with minimum of

joints. Align ductwork accurately at connections within 1/8- inch misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type, which will hold ducts true to shape and to prevent buckling.

- G. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct-plus- insulation with sheet metal flanges of same gauge as duct. Overlap opening on four sides by at least 1-1.2 inches.
- H. Support ductwork in manner complying with SMACNA "HVAC Duct Construction Standards." latest edition, hangers and supports sections. Where special hanging of duct work is detailed or shown on Drawings, Drawings shall be followed. Angles shall be attached to overhead construction in a manner so as to allow a minimum of 2 inches of movement in all directions with no bending or sagging of the angle.
- I. Seal ductwork after installation to seal class required and method prescribed in SMACNA "HVAC Leakage Test Manual", latest edition.
- J. Indoor Applications: Seal all standing seams and transverse joints in all sheetmetal ductwork with Hardcast "Iron Grip" premium flexible water based duct sealant.
- K. Outdoor Applications: Seal all standing seams and transverse joints in all sheetmetal ductwork with Hardcast Model Duct Seal 321 premium flexible water based duct sealant with UV inhibitors.
- L. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- M. Use double nuts and lock washers on threaded rod supports.
- N. Connect diffusers boots to low pressure ducts directly or with 7 feet maximum length of flexible duct held in place with strap or clamp.
- O. Connect flexible ducts to metal ducts with Panduit style draw bands. Use one draw band in the inner liner and a second draw band over the outer vapor barrier jacket.
- P. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

### 3.2 CLEANING AND PROTECTION

- A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances, which might cause corrosive deterioration of metal or where ductwork is to be painted.
- B. Temporary Closure: At ends of ducts, which are not connected to equipment or air distribution devices as time of ductwork installation, provide temporary closure of polyethylene film or other covering, which will prevent entrance of dust and debris until time connections are to be completed.

### 3.3 CLEANING UP

- A. Upon completion of work remove materials, equipment, apparatus, and tools, and leave premises clean, neat, and orderly.

### 3.4 SCHEDULES

- A. Ductwork Material:
  - 1. Low Pressure Supply (System with Cooling Coils): Galvanized steel.
  - 2. Return and Relief: Galvanized steel.
  - 3. General Exhaust: Galvanized steel.
- B. Ductwork Pressure Class:
  - 1. Supply, Return: 2 inch.
  - 2. Outside Air: 2 inch.

3. Exhaust: 2 inch.
4. All duct with operating pressure higher than 2" w.c. shall be constructed to exceed the operating pressure.

**END OF SECTION 23 31 00**

**SECTION 23 33 00 - AIR DUCT ACCESSORIES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Air turning devices.
- B. Backdraft dampers.
- C. Combination fire and smoke dampers.
- D. Duct access doors.
- E. Duct test holes.
- F. Flexible duct connections.
- G. Volume control dampers.

**1.2 RELATED REQUIREMENTS**

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 23 05 53 – Identification for HVAC Piping and Equipment.
- C. Section 23 31 00 - HVAC Ducts and Casings.

**1.3 REFERENCE STANDARDS**

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2022
- B. NFPA 92 - Standard for Smoke Control Systems; 2022.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
- D. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
- E. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, and hardware used. Include electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Provide instructions for combination fire and smoke dampers.

**1.5 PROJECT RECORD DOCUMENTS**

- A. Record actual locations of access doors and test holes.

**1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Protect dampers from damage to operating linkages and blades.

**PART 2 PRODUCTS**

**2.1 AIR TURNING DEVICES**

- A. Manufacturers:
  - 1. ProRail, Ductmate Industries, Inc.
  - 2. Duro Dyne Corp.
  - 3. Airsan Corporation
  - 4. Anemostat Products Division, Dynamics Corporation of America
  - 5. Environmental Elements Corporation, Subs. Koppers Company, Inc.
- B. Manufactured turning vanes with 2" single thickness curved blades set at 1-1/2" on-center mounted in 2" vane rails, self-aligning, hot dipped galvanized steel.
- C. Turning vanes, vane rails and mounting shall be constructed and installed in accordance with the SMACNA "HVAC Duct Construction Standards".

**2.2 BACKDRAFT DAMPERS**

- A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

**2.3 COMBINATION FIRE AND SMOKE DAMPERS**

- A. Manufacturers:
  - 1. **Ruskin Company [www.ruskin.com](http://www.ruskin.com).**
  - 2. Ruskin Manufacturing; Model FSD60FA or FSD60G or FSD60OW.
  - 3. Ruskin Manufacturing; Model FSD36C for ceiling application.
- B. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
- C. Provide factory sleeve and collar for each damper.
- D. Multiple Blade Dampers: Fabricate with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.
- E. Operators: UL listed and labelled oil immersed with spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on exterior of duct and link to damper operating shaft. Provide circuitry to activate pilot light on remote key (test) switch located in corridor ceiling adjacent to damper.
- F. All actuators for combination fire and smoke dampers or smoke dampers shall be rated for continuous "On" duty and shall have a cycle time requirement of no more frequently than every six months.

**2.4 DUCT ACCESS DOORS**

- A. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
- B. Access doors with sheet metal screw fasteners are not acceptable.

**2.5 DUCT TEST HOLES**

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

## 2.6 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections (Indoors): Fabric crimped into metal edging strip.
  - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
    - a. Net Fabric Width: Approximately 8-inches wide.
  - 2. Metal: 3 inches wide, 24 gage, 0.0239 inch thick galvanized steel.
- C. Flexible Duct Connections (Outdoors): Fabric crimped into metal edging strip.
  - 1. Fabric: Ventfabrics Ventlon UL listed fire-retardant duPont's Hypalon coated woven glass fiber fabric to NFPA 90A, minimum density 26 oz per sq yd, sunlight, ozone and weather resistant.
    - a. Net Fabric Width: Approximately 6 inches wide.
  - 2. Metal: 3 inches wide, 24 gage thick galvanized steel.

## 2.7 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers for Round Ductwork and Rectangular Ductwork up to 10 inches in Height: 16 gauge steel minimum.
- C. Multi-Blade Damper for Rectangular Ductwork: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware; Model CD35 Manufactured by Ruskin. Provide Ruskin Model CD50 for installation in medium pressure ductwork and/or ducts with velocities exceeding 1500 FPM.
- D. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings, Ventlok Model 607. On multiple blade dampers, provide oil impregnated nylon or sintered bronze bearings.
- E. Quadrants:
  - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
  - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

### 3.2 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct access doors for inspection and cleaning before filters, before coils, at fans where not supplied with equipment access doors, at automatic dampers, at fire dampers, at combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 24 x 30 inch size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.



- E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. Install combination smoke and fire dampers in accordance with NFPA 92A.
- G. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- J. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.
- K. Provide label at access points to above ceiling and in-wall Air Duct Accessory locations. Refer to Section 23 05 53 Identification for HVAC Piping and Equipment.
- L. Provide turning vanes at all duct elbows of throat radius less than one duct width, no exceptions. Where throat radius of one duct width is not practical, provide square elbow with turning vanes.

**END OF SECTION 23 33 00**

**SECTION 23 34 23 - POWER VENTILATORS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof exhausters.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.

1.3 REFERENCE STANDARDS

- A. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; <http://www.amca.org/certified/search/company.aspx>.
- B. AMCA 99 - Standards Handbook; 2010.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2005.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2007.
- E. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; Air Movement and Control Association International, Inc.; <http://www.amca.org/certified/search/company.aspx>.
- F. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- G. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.
- H. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Indicate installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. Protect units from physical damage by storing indoors or off site until roof mounting curbs or other mountings are in place, ready for immediate installation of units.

1.7 WARRANTY

- A. See Section 01 78 36 – Warranties, for additional warranty requirements.
- B. Provide a full parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.

1.8 FIELD CONDITIONS

- A. Permanent ventilators may not be used for ventilation during construction.

1.9 EXTRA MATERIALS

- A. Supply two sets of spare belts for each belt drive fan.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Greenheck: [www.greenheck.com](http://www.greenheck.com).
- B. Loren Cook Company: [www.lorencook.com](http://www.lorencook.com).
- D. PennBarry: [www.pennbarry.com](http://www.pennbarry.com).
- E. or approved equal.

2.2 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Conform to AMCA 99.
- E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.3 ROOF EXHAUSTERS

- A. Product Requirements:
  - 1. Performance Ratings: Conform to AMCA 210.
  - 2. Sound Ratings: AMCA 301, tested to AMCA 300, and bearing AMCA Certified Sound Rating Seal.
  - 3. Fabrication: Conform to AMCA 99.
  - 4. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- B. Fan Unit: V-belt or direct driven as indicated on drawings, with spun aluminum housing; resilient mounted motor; 1/2-inch mesh, 0.62-inch-thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.
- C. Roof exhaust fans shall be centrifugal type. Wheels shall be statically and dynamically balanced.
- D. Motors shall be heavy duty ball bearing type, carefully matched to the fan load, and furnished at the specified voltage, phase and enclosure. Motors and drives shall be mounted on vibration isolators. Fresh air for motor cooling shall be drawn into the motor compartment from an area free of discharge contaminants. Motors shall be readily accessible for maintenance.
- E. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum cataloged operating speed. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts. Motor pulleys shall be adjustable for final system balancing.
- F. A disconnect switch shall be factory installed and wired from the fan motor to a junction box installed within the motor compartment.
- G. A fan conduit chase shall be provided through the curb cap to the motor compartment for ease of installation.
- H. All fans shall bear the AMCA Certified Ratings Seal for sound and air performance.
- I. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

- J. Roof Curb: 14-inch-high (minimum w/ 8 inch minimum clearance between bottom of flashing and top of roofing) self-flashing of galvanized steel with continuously welded seams, built-in cant strips.
- L. Disconnect Switch: See drawings for factory wired or provided by electrical.
- M. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return. Where intended to operate closed under pressure, damper leakage shall be rated not to exceed 10 cfm/s.f. at 1.0" w.c.
- N. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.
- C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.
- D. Provide sheaves required for final air balance.
- E. Install backdraft dampers on inlet to roof exhausters.

**END OF SECTION**

**SECTION 23 81 43 - SPLIT-SYSTEM HEAT PUMPS**

**PART 1 - GENERAL**

**1.1 CONDITIONS OF THE CONTRACT**

- A. The Conditions of the Contract (General, Supplementary, and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.
- B. Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

**1.2 WORK INCLUDED**

- A. Installation of split system heat pumps, including VRF systems, as required for project.
- B. **MANUFACTURER:** Subject to compliance with requirements, provide split system heat pumps of one of the following:
  - 1. Mitsubishi
  - 2. Trane
  - 3. Carrier

**1.3 QUALITY ASSURANCE**

- A. **FLAME-SMOKE RATINGS:** Except as otherwise indicated, provide thermal insulation with flame-spread index of 25 or less, fuel- contributed index of 50 or less, and smoke-developed index of 50 or less.
- B. **AMCA STANDARDS:** Comply with Air Movement and Control Association (AMCA) Standards as applicable to testing and rating fans.
- C. **SMACNA COMPLIANCE:** Comply with Sheet metal and Air-Conditioning Contractors National Association (SMACNA) ductwork construction standards as applicable to split system heat pumps.
- D. **U.L. COMPLIANCE:** Provide electric components for split system heat pumps, which have been listed and labeled by Underwriters Laboratories or by a testing organization of equal standing.

**1.4 SUBMITTALS**

- A. **PRODUCT DATA:** Submit manufacturer's specifications for split system heat pumps showing dimensions, weight, capacities, ratings, certified fan performance with operating point clearly indicated, motor electrical characteristics, gauges and finishes of materials, and installation instructions.
- B. **MAINTENANCE DATA:** Submit maintenance instructions, including lubrication instructions, filter replacement, motor and drive replacement, and spare parts lists. Include this data in maintenance manuals only.

**PART 2 - MATERIALS**

**2.1 SPLIT-SYSTEM HEAT PUMPS**

- A. **GENERAL:** Furnish and install split-system air to air heat pump systems, complete with automatic controls. The units shall be a standard product of a firm regularly engaged in the manufacture of heating/cooling equipment. The equipment shall be shipped completely factory assembled, piped and wired internally ready for field connections. Provide thermal overload protected motors.
  - 1. All wiring shall be in compliance with CEC.
- B. **HEATING/COOLING SYSTEM:** The total certified heating/cooling capacity shall not be less than scheduled. The compressor power input shall not exceed that of the unit specified.
- C. **COILS:** Shall be non-ferrous construction with aluminum fins mechanically bonded to durable copper tubes, unless noted otherwise on plans. Coils shall be pressure-leak tested.
  - 1. The compressor shall be resiliently mounted, have built-in crankshaft lubrication, crankcase heater, discharge temperature limited, and current- and temperature- sensing motor overloads.

**2.2 INDOOR AIR MOVING EQUIPMENT**

- A. **CABINET:** Galvanized steel with a baked-on outdoor enamel paint finish. Cabinet panels where conditioned air is handled shall be fully insulated.
- B. **SERVICE ACCESS:** All components, wiring, and inspection areas shall be completely accessible through removable panels.
- C. **SUPPLY AIR BLOWERS:** Centrifugal blowers shall have direct-drive motors. Blower wheel shall be statically and dynamically balanced.
- E. **Air Filters:** Provide 2-inch-thick MERV 13 filters at factory supplied filter slot.
- G. **Control system** shall be microprocessor based for complete standalone operation, with factory thermostats for each zone or field supplied as indicated on drawings.

**2.3 CONDENSATE DRAIN**

- A. Provide type L hard drawn copper tubing with wrought copper solder joint fittings; no iron to copper connections; copper fittings with IPS outlets and threaded brass nipples at connections to fixtures and equipment; di-electric couplings or unions at connections to dissimilar materials. Supply piping with temporary caps on all piping.

**PART 3 - EXECUTION**

**3.1 INSPECTION**

- A. Examine areas and conditions under which heat pump units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

**3.2 INSTALLATION OF HEAT PUMP UNITS**

- A. Install heat pump units where indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices, to ensure that units comply with requirements and serve intended purposes.
- B. Field verify all refrigerant line lengths, elevation change, and sizing with manufacturer.
- C. Furnish and install all low voltage wiring as required by factory installation instructions.

**3.3 TESTING**

- A. Upon completion of installation of heat pump units, start up and operate equipment to demonstrate capability and compliance with requirements. Field correct malfunctioning units, then retest to demonstrate compliance.

**END OF SECTION 23 81 43**

**SECTION 26 01 00 - GENERAL REQUIREMENTS OF ELECTRICAL WORK**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This Section describes the general requirements for the electric work. These requirements apply to all sections of Division 26.
- B. Provide electrical materials, equipment, installation, and testing for the electrical work as shown on the plans.

**1.02 DESCRIPTION**

- A. Provide all equipment and materials for a complete, operational electrical system as described herein and shown on the plans.

**1.03 CODE COMPLIANCE**

- A. Perform all work in accordance with the following codes. The latest adopted edition, or supplement, or amendment thereto in effect at the time of submittal to the building department shall be considered to be the issue in effect of all applicable laws, codes, and regulations including, but not limited to:
  - 1. California Electrical Code (CEC)
  - 2. California Building Code (CBC)
  - 3. California Fire Code (CFC)
  - 4. California Building Standards Administrative Code (CCR)
  - 5. Title 19, California Code of Regulations, Public Safety, State Fire Marshal Regulations
  - 6. Occupational Safety and Health Act (OSHA)
  - 7. California Green Building Standards Code
  - 8. All Applicable State Local Codes and Regulations
  - 9. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
  - 10. California Energy Code

**1.04 PERMITS, FEES, AND INSPECTIONS**

- A. Obtain all permits that are required for the work.
- B. Call for all local building department inspections.
- C. Obtain approvals from local building inspector prior to final observation by Engineer.
- D. Advise Owner Representative, one week prior to:
  - 1. Installation of underground work. Obtain Owner Representative's approval prior to backfill. The Owner Representative may direct uncovering of any work not so approved.
  - 2. Shut down of equipment.
  - 3. Start of interior rough-in work.
  - 4. Start of wire pulling.
  - 5. Installation of switchboards.
  - 6. Installation of lighting fixtures.
  - 7. Installation of wiring devices.
  - 8. Connection of mechanical equipment.

**1.05 STANDARDS**

- A. Comply with the current applicable standards of the listed agencies for electrical materials and installation.
- B. Underwriters Laboratories, Inc. (UL): Provide a UL label or evidence of UL listing for all electrical material, unless the material is of a type for which a label or listing service is not provided.
- C. National Electrical Manufacturer's Association (NEMA).
- D. American National Standards Institute (ANSI).
- E. American Society for Testing Materials (ASTM).
- F. Insulated Power Cable Engineers Association.
- G. Institute of Electrical and Electronic Engineers (IEEE).

**1.06 SUBMITTALS**

- A. Provide submittals for electrical equipment and materials in accordance with the Contract's General Conditions.
- B. Procedure: Submit under provisions of the contract's General Conditions. Provide submittals for items listed documenting compliance with specification requirements.
  - 1. Test Reports: Reports of field tests, continuing copies of the test results, in tabulated form with the signature of the responsible person.
  - 2. Insulation resistance.
  - 3. Operation and Maintenance Manual, in accordance with the contract's General Conditions.
  - 4. Record Drawings, in accordance with the contract's General Conditions.

**1.07 ACTION SUBMITTALS**

- A. Submit manufacturers' data and shop drawings in accordance with General Requirements.
- B. Product Data: For each type of equipment.
  - 1. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
- C. Shop Drawings: For each equipment and related equipment.
  - 1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment.
    - a. Plan drawings to indicate clearances between equipment, adjacent surfaces, and other items. Comply with indicated minimum code and manufacturer required clearances.
  - 2. Include equipment weight and location of center-of-gravity for each section.
- D. Field Quality-Control Submittals:
  - 1. Field Quality-Control Reports:
    - a. Test procedures used.
    - b. Test results that comply with requirements.
    - c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

**1.08 INFORMATION SUBMITTALS**



- A. Manufacturers' Published Instructions: Record copy of official installation instructions issued to Installer by manufacturer for the following:
  - 1. Handling, storing, and providing temporary heat.
  - 2. Mounting accessories and anchoring devices.
  - 3. Testing and adjusting overcurrent protective devices.
- B. Sample warranties.

**1.09 CLOSEOUT SUBMITTALS**

- A. Warranty documentation.
- B. Operation and Maintenance Manuals:
  - 1. Furnish in accordance with the contract's General Conditions.
  - 2. Furnish set of operation and maintenance manuals prior to final inspection, bound in 8-1/2 x 11-inch three-ring side binders with durable plastic covers.
  - 3. Provide a separate section for each system, with a table of contents and index tabs for each volume.
  - 4. Part 1: Directory, listing names and addresses and telephone numbers of Electrical Engineer and Electrical Subcontractor.
  - 5. Part 2: Operation and maintenance instructions, arranged by system. For each system, give names, addresses and telephone numbers of suppliers and factory service representatives. Incorporate the following:
    - a. Complete instructions regarding operation and maintenance of all equipment involved.
    - b. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.
    - c. Copy of all guarantees and warranties issued.
    - d. Copy of all letters of compliance or certification issued.
    - e. Copy of the approved shop drawings with all data concerning changes made during construction.
    - f. Conduit and wiring diagrams. Terminal designation on diagrams must correspond to the actual field installation.
    - g. Names, addresses, and telephone numbers of manufacturers, manufacturer's representatives, service facilities, and normal channels of supply.
  - 6. Extraneous Data:
    - a. Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete, or otherwise clearly indicate, all manufacturer's data with which this installation is not concerned.
- C. Record drawings
  - 1. The Contractor shall maintain at the job site office an up to date as-built drawing set showing actual installation of the electrical system and equipment. This set shall contain approved changes and shall be kept clean, up to date, and in good condition. Incomplete as-built markups will be returned to the Contractor for additional documentation of installation; any additional time tracing and documenting information will be at the Contractor's expense.
  - 2. Use this set of drawings for no other purpose.

3. Where any material, equipment, or system components are installed differently from that shown, indicate differences clearly and neatly using ink or indelible pencil.
4. At project completion, submit record set of full size drawings and four copies all marked to show final as-built conditions. These shall be turned over to the Owner Representative upon completion.

**1.10 MAINTENANCE MATERIAL SUBMITTALS**

- A. Special Tools: Furnish to Owner proprietary equipment, keys, and software required to operate, maintain, repair, adjust, or implement future changes to equipment, that is packaged with protective covering for storage on-site and identified with labels describing contents.

**1.11 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver equipment in sections or lengths that can be moved past obstructions in delivery path.

**1.12 MATERIALS AND SUBSTITUTIONS**

- A. Provide new material of the quality specified and satisfactory to the Owner Representative.
  1. Provide major equipment which is the product of a manufacturer who has, for a period of not less than five years been in successful manufacture of similar equipment to that specified and who has a catalog covering ratings and specifications of proposed equipment.

**1.13 DRAWINGS AND SPECIFICATIONS**

- A. Data given herein and on the plans are exact as could be secured, but their absolute accuracy is not guaranteed. Plans and specifications are for the assistance and guidance of the Contractor and exact locations, distances, levels, and other data will be governed by the structures.
- B. Clarification of plans and specifications for the purpose of facilitating construction, but not involving additional labor and materials, may be prepared during construction by the Engineer and authorized by the Owner Representative. Said revised plans and specifications shall become a part of the contract. The Contractor shall conform to the revised plans and specifications at no additional cost to the Owner.
- C. Layouts of equipment, accessories, and wiring systems are diagrammatic but follow these as closely as possible. Examine Architectural, Structural, Mechanical, and other drawings, noting all conditions that may affect this work. Report conflicting conditions to the Owner Representative for adjustment before proceeding with the work. Should the Contractor proceed with work without so reporting the matter, they do so, on their own responsibility and shall alter work if directed by the Owner at their own expense.
- D. The right is reserved to make minor changes in the locations of equipment and wiring systems shown, providing the change is ordered before conduit runs and/or work directly connected to same is installed and no extra materials are required.

**1.14 UTILITY COORDINATION**

- A. Coordinate with the electric utility company, the telephone company, and the cable television company to determine service equipment requirements, conduit and backfill requirements, electric metering requirements and other requirements to provide complete utility services, adequate to supply the electrical, communication, and television system(s) indicated. Provide materials that are specified in Division 26 in addition to conforming to utility company requirements.
- B. Include in bid, all work required by the utility companies. All work required for utility services shall be in accord with contract documents, specifications, drawings and as required by the utility companies.
- C. Use extreme caution when digging to avoid buried electrical cables.

1. Before digging, call:  
(800) 642-2444
2. The Contractor shall use ground penetration radar (GPR) to identify underground infrastructure (conduits and pipes) and hand dig around existing underground infrastructure (conduits and pipes).

**1.15 SUPERVISION**

- A. Provide adequate and competent supervision. Maintain complete control of the project execution and complete liability for the materials and work until the job is completed and accepted by the Owner.

**1.16 MANUFACTURER'S INSTRUCTION**

- A. Follow the manufacturer's instructions when specific installation or connection details are not indicated or specified.
- B. Notify the Engineer of conflicts between the manufacturer's instructions and installation or connection details prior to the installation of materials.

**1.17 WORKMANSHIP**

- A. Firmly and permanently secure in place all electrical equipment to the structure so that it is level, plumb, and true with the structure and other equipment. Installation methods shall be as recommended by the National Electrical Contractors' Standard of Installation, except when methods specified or shown on the plans differ. The minimum installation standards shall be as required by the Codes.

**1.18 PROTECTION**

- A. Protect all equipment and materials required for the performance of this work from damage by the elements, vandalism, or work during construction.
  1. Do not subject the work and materials of other trades to damage during execution of the work in this division of the specifications.

**1.19 COORDINATION WITH OTHER TRADES**

- A. Coordinate with other trades and promptly transmit all information required by them. Coordinate the sequence of construction with other trades to ensure that all work proceeds with a minimum of interference and delay. Perform all work that requires relocation due to negligence or absence of regard for the work of other trades.

**1.20 EXAMINATION OF SITE**

- A. Examine the site prior to bid to determine existing site conditions that may affect the work. No allowance will be allowed for any extra work required due to a failure to recognize, or negligence to discover conditions prior to bid.

**1.21 STRUCTURAL REQUIREMENTS**

- A. Secure all anchors for electrical equipment in a manner that will not decrease the structural value of any structure to an unsafe level. Inform the Structural Engineer of any proposed modifications to the structure that involves cutting or patching of concrete, masonry, steel, or wood in the project.

**1.22 DEMONSTRATIONS:**

- A. After testing and final inspection, demonstrate operation of listed systems and equipment to Owner Representative.
- B. Arrange date of test with Owner Representative.
- C. Advise the manufacturers' representative to be present when required.
- D. Instruct Owner's personnel in operation, adjustment and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

**1.23 GUARANTEE:**

- A. Guarantee the electrical work against defects in work or materials for one year after filing of Notice of Completion.
- B. Undertake repairs within 24 hours after notice from the Owner.
- C. If the operation of the electrical system fails to conform to Division 26 requirements, approved submittals, or operation and maintenance manuals, the Owner may operate the electrical system without liability to Owner. Repair or replace defective or unsatisfactory equipment or systems.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.01 GENERAL**

- A. All electricians to be state certified and apprentices in an approved training program.
- B. When changes in location of any work are required, obtain approval of Owner Representative before making changes.
  - 1. Make minor changes at no extra cost.
- C. Do not change indicated sizes without written approval of Owner Representative.
- D. Provide all necessary offsets and crossovers in conduits, raceways, cabletrays, and ducts.
- E. Existing equipment or electrical wiring, which is to remain, but has been removed to facilitate the installation of the new equipment, shall be restored to its original operating condition.
- F. Where electrical items penetrate fire or smoke rated walls, ceilings, and floors, comply with Contract's General Conditions.
- G. Provide concrete foundations and housekeeping pads for all floor mounted and site electrical equipment.
  - 1. Submit shop drawings for concrete foundations and housekeeping pads.
  - 2. Chamfer top edges  $\frac{3}{4}$ " (18mm).
  - 3. Make all faces smooth.
  - 4. Set anchor bolts for equipment.
  - 5. Coordinate the size of all pads, the location of all anchor bolts.
  - 6. All required working clearances shall be maintained.

**3.02 QUALITY ASSURANCE AND PROJECT SAFETY**

- A. Provide quality assurance and project safety programs. Satisfy the minimum acceptable requirements provided in the specifications.

**3.03 PREPARATION**

- A. Examine Drawings and Site; be familiar with types of construction where electrical installation is involved.
  - 1. Work shall be neatly installed in a professional manner in accordance with NECA Standard of Installation. Work shall be coordinated with other trades to avoid conflicts. Clarifications will be made by Owner Representative and minor adjustments shall be made without additional cost to Owner. Obtain clarification from Owner Representative concerning any obvious discrepancies or omissions in work before bidding. All work involved in correcting obvious errors or omissions after award of Contract shall be performed as directed by Owner Representative without additional cost to Owner.

**3.04 WORKING SPACE**

- A. Provide adequate working space around electrical equipment in compliance with OSHA Article 4 of Electrical Safety Orders. Provide CEC required clearance in front of all electrical equipment.

**3.05 PRODUCT DELIVERY, STORAGE, HANDLING, AND PROTECTION**

- A. Inspect materials upon arrival at Project and verify conformance to Contract Documents. Prevent unloading of unsatisfactory material including Owner furnished material. Handle materials in accordance with manufacturer's applicable standards and suppliers' recommendations, and in a manner to prevent damage to materials. Store packed materials in original undamaged condition with manufacturer's labels and seals intact. Containers which are broken, opened, damaged, or watermarked are unacceptable and shall be removed from the premises and replaced at no additional cost to the Owner.
- B. All material shall be stored in an enclosed, dry building or trailer. Provide temperature and humidity control where applicable. No material for interior installation, including conductors, shall be stored other than in an enclosed weathertight structure. Equipment stored other than as specified above shall be removed from the premises and replaced at no additional cost to the Owner.
- C. Equipment and materials shall not be installed until such time as the environmental conditions of the job site are suitable to protect the equipment or materials. Conditions shall be those for which the equipment or materials are designed to be installed. Equipment and materials shall be protected from water, direct sunlight, cold or heat. Equipment or materials that are damaged or which are subjected to these elements are unacceptable and shall be removed from the premises and replaced at no additional cost to the Owner.

**3.06 CARE AND CLEANING**

- A. Remove oil, dirt, grease and foreign materials from all raceways, fittings, boxes, panelboard trims and cabinets to provide a clean surface for painting. Touch-up scratched or marred surfaces of lighting fixtures, panelboard and cabinet trim, motor control center, switchboard or equipment enclosures with paint furnished by the equipment manufacturers specifically for that purpose.
- B. Accessible elements of disconnecting and protective devices of equipment, coils of dry type transformers and the like shall be cleaned with compressed air (less than 15 PSI) and the enclosures vacuum cleaned prior to being energized.
- C. Clean light fixtures and lamps thoroughly, just prior to final inspection. Fixture enclosures, shielding, etc., shall be cleaned by an approved method.
- D. Do not paint trim covers for flush mounted panelboards, telephone cabinets, pull boxes, junction boxes and control cabinets unless required by the Owner Representative. Remove trim covers before painting. Under no conditions shall locks or exposed trim clamps be painted.

- E. Where fire rated plywood backboards are used to mount equipment provided under Division 26, paint backboards with three coats of white semi-gloss fire retardant paint under Division 26.
- F. All broken, damaged, or otherwise defective parts shall be repaired or replaced without additional cost to the Owner. Work shall be left in a condition satisfactory to Owner Representative. At completion, carefully clean and adjust all equipment, fixtures and trim installed as part of this work. Systems and equipment shall be left in a satisfactory operating condition.
- G. All surplus materials and debris resulting from this work shall be periodically cleaned out and removed from site; this includes surplus excavated material.

**3.07 EXCAVATING AND BACKFILLING**

- A. Excavate and backfill as required for installation of electrical work. Restore all surfaces, roadways, sod, walks, curbs, walls, existing underground installation, etc., cut by installations to original condition in an acceptable manner. Maintain all warning signs, barricades, flares, and lanterns as required by the OSHA Safety Orders and local ordinances.
- B. Excavation: Dig trenches straight and true to line and grade, with bottom clear of any rock points. Support conduit for entire length on undisturbed original earth. The minimum conduit depth of pipe crown shall be 2' below finished grade.
- C. Backfill: All backfill material shall be per Section 31 20 00 – “Earth Moving” and free of rubble, rubbish, or vegetation. Trenches shall be backfilled and compacted per Section 31 20 00 – “Earth Moving” in layers not to exceed 6" when compacted.

**3.08 CUTTING AND PATCHING**

- A. Provide necessary cutting and patching required to accomplish the work of Division 26.
- B. Do not endanger the stability of the structure by cutting, drilling, or otherwise modifying the structural members of the building. Direct all requests for structural modifications to the Owner Representative for approval. Proceed with these modifications only as directed by the Owner Representative.
- C. Cutting and patching requirements will be modified only if General Construction Specifications and drawings specifically state that certain portions or all cutting and patching required for each of the various trades is to be performed.
- D. Refer to General Construction Specifications for execution and requirements for patching and painting and comply with applicable provisions as to materials and quality of installation.

**3.09 PROTECTION**

- A. In performance of work, protect work from damage. Protect electrical equipment, stored and installed, from dust, water or other damage.

**3.10 EQUIPMENT IDENTIFICATION**

- A. Panelboards, remote control switches, terminal boxes, etc., shall be properly identified according to the Division 26 “Identification for Electrical Systems” section.

**3.11 RUST INHIBITER**

- A. Channels, joiners, hangers, caps, nuts and bolts and associated parts shall be plated electrolytically with zinc followed immediately thereafter by treating freshly deposited zinc surfaces with chromic acid to obtain a surface which will not form a white deposit on surface for an average of one hundred twenty (120) hours when subjected to a standard salt spray cabinet test or shall be hot dipped galvanized.

**3.12 ELECTRICAL SYSTEMS OPERATIONAL TESTS, MANUFACTURERS SYSTEMS CERTIFICATION AND DESIGN AUTHORITY ASSISTANCE**

A. Testing:

1. Provide tests specified in other sections. Test all wiring and connections for continuity and grounds; where such test indicates faulty insulation or other defects, locate, repair and retest. Balance loads at panelboards. Furnish all testing equipment.
2. Prior to energization of equipment, check the insulation resistance of feeders, with a 500-volt "Megger".
3. Tests:
  - a. Grounding systems, for resistance to earth. Provide additional grounding electrodes if main service or separately derived system ground resistance exceeds 5 ohms.
  - b. Coordinate phase rotation of all motors and panels with installer to ensure proper direction of rotation.
4. Prior to the final inspection, the systems or equipment shall be tested and reported as specified therein. An electronic copy of the tests shall be submitted to the Owner Representative for approval. Testing does not replace the requirement for final inspection of the project work.
5. Take precaution during the testing period to ensure the safety of personnel and equipment.
6. All electrical systems shall be tested for compliance with the specifications.

B. Manufacturers Certifications:

1. The electrical systems specified herein shall be reviewed for compliance with these specifications, installation in accordance with the manufacturers recommendations and system operation.

C. Design Authority Assistance:

1. Remove equipment covers (i.e. panelboard trims, motor controls, device plates, and junction box covers) as directed for inspection of internal wiring. Accessible ceilings shall be removed as directed for inspection of equipment installed above ceilings.
2. Energize and de-energize circuits and equipment as directed. Demonstrate operation of equipment and systems as directed by the Owner Representative.

**3.13 CLOSING OF UNINSPECTED WORK**

- A. Do not allow or cause any work installed hereunder to be covered up or enclosed before it has been inspected and approved.
- B. Should any work be enclosed or covered up before it has been approved, uncover such work and after it has been inspected and approved, make all repairs necessary to restore work of others to conditions in which it was found at time of cutting, all without additional cost to the Owner.

**3.14 TEMPORARY FACILITIES**

- A. Provide temporary shop office and storage space on site only at locations approved by the Owner Representative. Remove these facilities upon completion of work.

**3.15 NOISE AND VIBRATION**

- A. Cooperate in reducing objectionable noise or vibration. If noise or vibration occurs as a result of the use of improper material or installation, correct these conditions at no cost to the Owner.

**END OF SECTION 26 01 00**



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**SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. The work required under this section of the specifications consists of furnishing, installing and connecting the building wiring system, 600 volts and below. Exterior branch circuit wiring and feeder conductors extended beyond the building are included. Wiring systems for communication and alarm systems are not included in this section unless specified to be included, by reference, in the respective specification sections for alarm and communication systems.

**1.02 DESCRIPTION**

- A. This section describes requirements for wire and cable.

**1.03 RELATED WORK**

- A. Section 26 01 00: General Requirements for Electrical Work.

**1.04 REFERENCE STANDARDS**

- A. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

**1.05 SUBMITTALS**

- A. Procedure: Submit under provisions of Division 1 - General Conditions.
- B. Provide submittals for items listed documenting compliance with specification requirements.
- C. Product Data:
  - 1. Electrical Materials: Manufacturer's current published catalog sheets.

**PART 2 - PRODUCTS**

**2.01 CONDUCTOR AND CABLE GENERAL REQUIREMENTS**

- A. Provide products that comply with requirements of California Electrical Code.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide conductors and cables with lead content less than 300 parts per million.
- D. Provide new conductors and cables manufactured not more than one year prior to installation.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- F. Comply with NEMA WC 70.
- G. Comply with FS A-A-59544 where applicable.
- H. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- I. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- J. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.
- K. Conductors and Cables Installed in Cable Tray: Listed and labeled as suitable for cable tray use.
- L. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.

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- M. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- N. Conductor Material:
  - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
  - 2. Provide copper conductors except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
  - 3. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
  - 4. Tinned Copper Conductors: Comply with ASTM B33.
- O. Conductor Color Coding:
  - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  - 2. Color Coding Method: Integrally colored insulation.
  - 3. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
  - 4. Color Code:
    - a. 208Y/120 V, 3 Phase, 4 Wire System:
      - b. Phase A: Black
      - c. Phase B: Red
      - d. Phase C: Blue
      - e. Neutral/Grounded: White
      - f. Equipment Ground, All Systems: Green.
    - g. 480Y/277 V, 3 Phase, 4 Wire system:
      - h. Phase A: Brown
      - i. Phase B: Orange
      - j. Phase C: Yellow
      - Neutral/Grounded: Grey

## 2.02 WIRE AND CABLE

- A. Conductor: Insulated copper, individual conductors, 98 percent conductivity, stranded.
  - 1. Power conductors, #12 AWG, minimum to 750 MCM, stranded.
- B. Insulation:
  - 1. Rated 600 volts as follows:
  - 2. 290 DEG. Celcius

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Item	Size (AWG)	Insulation Type
Branch Circuits (dry and damp locations)	#12 to #4/0	THHN
Branch Circuits (wet)	#12 to #4/0	THWN-2
Fixture Taps (dry & damp)	#12	THHN
Feeders (dry & damp)	#12 to #750 MCM	THHN
Feeders (wet)	#12 to #750 MCM	RHW-2, USE-2, THWN-2 XHHW-2
Controls (dry & damp)	#14 to #10	THHN
Controls (wet)	#14 to #10	THWN-2

### 2.03 WIRE CONNECTIONS

- A. Connect wire to binding post screw, stud, bolt or bus as follows:
- #10 AWG and smaller conductors, compression type, nylon, self-insulated grip spade lugs, T & B "Sta-Kon", Buchanan "Termend", Panduit "Pan-Term", or equal.
  - #8 AWG to #750 MCM copper conductors, solderless lug type mechanical copper connectors, with hex-head or allen type compression set screws with configuration to suit application, Burndy "QA", or equal.
  - #8 AWG to #750 MCM copper conductors, compression. Burndy YA-L, YA-L-TC series or equal
- B. Conductor Taps:
- #12 through #750 copper conductors, mechanical type for stranded copper wire. Burndy: KS, KS3, KVS, KVSU, QPX, or equal.
  - #12- #4/0 copper conductors, compression C type, Burndy YC-C series or equal.
  - #4- #750 MCM copper conductors, compression T type, Burndy YST or equal
- C. Splice wire as follows:
- #10 AWG and smaller conductors, twist-on solder-less, insulated spring connectors, 3M "Scotchlocks", T & B "Piggys" or equal.
  - #8 AWG to #750 MCM copper conductors, two-way connectors. Burndy: AMS or equal.
  - #8 AWG to #750 MCM copper conductors, compression connectors: Burndy: YS-L, YS, YS-T series or equal
  - Underground applications-Splice in underground pull box. Apply cast resin splice kit. 3M:85 Series or equal.
- D. Size, install and tighten wire terminal and splice connectors in accordance with manufacturer's instructions using only the manufacturer's recommended tooling. Copper connectors shall be used for copper conductors. Aluminum connectors shall be used for aluminum conductors.

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## 2.04 TAPE

- A. Wire Splices: Vinyl plastic electrical tape, 8.5-mil and 4.0-mil, Scotch 33.
- B. Conduit Wrapping: 10-mil vinyl wrapping tape, Manville, Minnesota Mining and Manufacturing Company.

## 2.05 WIRING ACCESSORIES

- A. Identify conductors with self-adhesive vinyl cloth markers, sized to fit the conductor insulation, with machine printed black marking, W.H. Brady, Thomas and Betts, or equal.

## PART 3 - EXECUTION

### 3.01 INSULATED CONDUCTORS AND CABLE

- A. Install all wiring in raceway system, except where conductors are indicated or specified not to be installed in raceway. Any conductors found to be damaged or defective, including insulation damaged during installation, shall be removed and replaced at no expense to the Owner.
  - 1. Pull conductors into raceway simultaneously where more than one is being installed in the same raceway.
  - 2. Use UL listed pulling compound or lubricant where necessary to reduce cable pulling tension below the manufacturer's recommended levels. Compound used shall not deteriorate conductor or insulation.
  - 3. Use pulling means, including fish tape, cable rope, or basket-weave wire/cable grips that will not damage cable or raceway.
- B. Connect all conductors. Torque each terminal connection to the manufacturers recommended torque value. A calibrated torquing tool shall be used to insure proper torque application
- C. Conductors shall be tested to be continuous and free of short circuits and grounds.
- D. Maintain phase rotation established at service equipment throughout entire project
- E. Group and tie with cable ties (T & B "Ty-Rap", or equal) all conductors within all enclosures, i.e., panels, motor controllers, equipment cabinets, switchboards, etc.
- F. Make splices in conductors only within junction boxes, wiring troughs and other enclosures as permitted by the California Electrical Code. Do not splice conductors in pull boxes, panel boards, safety switches, switchboard, switchgear, motor control center, or motor control enclosures.
- G. Support conductors installed in vertical raceways at intervals not exceeding those distances indicated in the California Electrical Code. Support conductors in pull boxes with bakelite wedge type supports or "Kellem" grips or equal, provided for the size and number of conductors in the raceway. Do not splice conductors in pull boxes used for vertical cable supports unless written permission for splicing is obtained.
- H. Make connections between fixture junction box and fixture with fixture wire.
- I. Control, communications or signal conductors shall be installed in separate raceway systems from branch circuit or feeder raceway, unless indicated otherwise on the drawings.
- J. Conductor lengths for parallel circuits shall be equal. Do not configure isolated phasing in separate conduits for parallel conductors.
- K. Install a minimum of 12" (300 mm) of slack conductor at each outlet.
- L. Thoroughly clean conductors prior to installing lugs and connectors.

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- M. Secure portable cables in accordance with the CEC. Install strain relief devices to prevent tension on terminations if cable is pulled. Install cable grips on drops and connect to outlet box or structure. Leave slack cable loop at drop point.
- N. Color code conductors by phase sequence A-B-C when looking into the front of the equipment from left-to-right, top-to-bottom or front-to-back. Provide conductors with the appropriate phase color or mark conductors with a minimum of 6 inches of phase tape on ends connected to terminals. Phase code conductors as listed:

Voltage	Phase A	Phase B	Phase C	Neutral	Ground
120/208	Black	Red	Blue	White	Green
277/480	Brown	Orange	Yellow	Grey	Green
120/240	Black	Orange	Blue	White	Green

- O. Identify all conductors with their respective circuit numbers at all boxes and terminals.
- P. Connections:
  - 1. Use twist-on solder-less connectors for splicing receptacle and lighting circuits #10 AWG wire size and smaller.
  - 2. Splice #12 and #10 AWG stranded conductors with compression connectors.
  - 3. Terminate conductors at motors with bolted connections, insulated with plastic tape.
  - 4. For conductor taps #8 through #750 MCM, provide mechanical copper connectors.
  - 5. For splices larger than #10 AWG, insulate and smooth the splice with insulation putty, tape with one half-lapped layer of 8.5-mil vinyl plastic electrical tape and two half-lapped layers of 7.0-mil vinyl plastic electrical tape.
  - 6. Use cast resin epoxy splices for splices in underground pullboxes.
  - 7. Wrap all wire and cable operating at 480 volts AC or more with electric arc and fireproofing tape where wires are installed with other wires or cables.

**END OF SECTION 26 05 19**

**SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 RELATED REQUIREMENTS**

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
  - 1. Includes oxide inhibiting compound.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

**1.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
- C. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

**1.03 SUMMARY**

- A. This section describes requirements for grounding of the power and communications systems.

**1.04 DESCRIPTION**

- A. Provide all equipment and materials for a complete grounding system.
  - 1. Power System Grounding.
  - 2. Communications System Grounding.
  - 3. Electrical Equipment and Raceway Grounding and bonding.

**1.05 RELATED REQUIREMENTS**

- A. Section 26 01 00: General Requirements for Electrical Work.

**1.06 REFERENCE STANDARDS**

- A. National Electrical Manufacturers Association (NEMA).
- B. American National Standards Institute (ANSI).

**PART 2 - PRODUCTS**

**2.01 GROUNDING AND BONDING REQUIREMENTS**

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

**2.02 GROUNDING AND BONDING COMPONENTS**

- A. General Requirements:

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1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
  1. Use insulated copper conductors unless otherwise indicated.
    - a. Exceptions:
      - 1) Use bare copper conductors where installed underground in direct contact with earth.
      - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
  1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
  2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
  3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
  1. Description: Copper rectangular ground bars with mounting brackets and insulators.
  2. Size: As indicated.
  3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
  1. Comply with NEMA GR 1.
  2. Material: Copper-bonded (copper-clad) steel.
  3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.
- F. Ground Access Wells:
  1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
    - a. Areas Exposed to Vehicular Traffic: Rated for not less than \_\_\_\_\_ pounds (\_\_\_\_\_ kN) vertical design load.
  2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
    - a. Round Wells: Not less than 8 inches (200 mm) in diameter.
    - b. Rectangular Wells: Not less than 12 by 12 inches (300 by 300 mm).
  3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches (250 mm).
  4. Cover: Factory-identified by permanent means with word "GROUND".
- G. Pre-Fabricated Signal Reference Grids:
  1. Description: Factory pre-fabricated grid manufactured from 2 inch wide (50 mm wide), 26 gage, flat copper strips spaced on 24 inch (610 mm) centers, factory-welded at each crossover.

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2. Low Impedance Risers: Factory fabricated 2 inch wide (50 mm wide), 26 gage, flat copper strips designed for connecting equipment enclosures to pre-fabricated signal reference grid.
- H. Oxide Inhibiting Compound: Comply with Section 26 05 19.

### **2.03 ACCEPTABLE MANUFACTURERS**

- A. Thomas and Betts Appleton, Raco, Oz Gedney, Blackburn, or approved equal.

### **2.04 MATERIALS**

- A. Ground Clamp: Water pipe connection, bronze two piece with serrated jaws, lug sized for grounding electrode conductor.
- B. Connectors, Compression Type: Bronze or Copper, pretreated with conductive paste, sized for conductor to which applied.
- C. Connectors, Exothermic Weld Type: Powder actuated weld. Bond made through exothermic reaction producing molten copper from premixed copper oxide and aluminum powder. Form bond in mold or crucible.

### **2.05 SECONDARY GROUNDING SYSTEM**

- A. The main grounding system shall consist of bare copper ground wires connected to a UFER ground placed below the bottom of the structural slab. The grounding system shall include, but is not limited to ground cables, fittings, connectors and all other devices and material as required to render the system complete and meet the requirements of California Electrical Code (CEC) Article 250. Connect grounding system to all building columns.
- B. Except where specifically indicated otherwise, all exposed non-current carrying metallic parts of electrical equipment, metallic raceways systems, grounding conductor in nonmetallic raceways and neutral conductor of the wiring system shall be grounded. The ground connection shall be made at the main service equipment of each service and shall be extended to all required components of CEC Article 250.

### **2.06 COMMUNICATIONS GROUNDING SYSTEM**

- A. All intermediate distribution frame (IDF) and main distribution frame (MDF) rooms shall have a Telecommunication Ground Bus Bar installed. Refer to drawings for specific size and assembly.
- B. The telecommunication service entrance MDF, shall have a minimum of a #2 AWG conductor with green outer sheath installed to the Telecommunication Ground Bus Bar located in the room.
- C. Except where specifically indicated otherwise, all facility MDFs shall have a minimum of a #4 AWG conductor with green outer sheath installed to the Telecommunication Ground Bus Bar located in each room.
- D. Except where specifically indicated otherwise, all facility IDFs shall have a minimum of a #6 AWG conductor with green outer sheath installed to the Telecommunication Ground Bus Bar located in each room.

### **2.07 GENERAL BRANCH CIRCUITS GROUNDING**

- A. All grounding conductor wire shall be insulated green copper conductors.
- B. All conduit bushings shall be grounding type.
- C. All grounding connections shall be made with solderless lugs and nonferrous hardware.

## **PART 3 - EXECUTION**



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### 3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
  - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.
  - 2. Indoor Installations: Unless otherwise indicated, install with 4 inches (100 mm) of top of rod exposed.
- D. Make grounding and bonding connections using specified connectors.
  - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
  - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
  - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
  - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 05 53.

### 3.03 FIELD QUALITY CONTROL

- A. See Section 01 45 00 - Quality Control, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

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### 3.04 INSTALLATION OF THE MAIN SERVICE ENTRANCE GROUND

- A. Provide a main service entrance grounding system with cables, connections, and ground buses as shown on the drawings and specified. Provide all necessary materials and testing of the grounding system.
- B. Where available the incoming water service, sprinkler system piping, building steel, UFER ground mat, footing electrode ground rod, and grounding ring encircling the building shall all be bonded together to form a grounding electrode system per CEC Section 250.
- C. Install the grounding system to obtain a ground resistance of the grounding grid not to exceed 5 ohms. Provide testing of the ground grid to obtain a ground resistance rating. If the resistance exceeds 5 ohms, contact the Owner's Representative for review of installation and additional procedures.

### 3.05 UFER GROUND SYSTEM

- A. UFER Ground System shall consist of a bare service ground copper ground conductor connected to a UFER ground placed below the bottom of the structural slab in contact with the earth.
- B. UFER Ground Mat: Form a continuous conductor mat by serpentineing No. 500 MCM bare copper conductor of minimum length 60 feet in the bottom of the structure foundation footing. The maximum resistance of the ground mat shall not exceed 5 ohms under normally dry conditions. If this ground resistance cannot be obtained with the 60 feet of mat conductor, additional mat shall be installed in contact with the earth in the bottom of the structural foundation.

### 3.06 TELECOMMUNICATION GROUND SYSTEM

- A. Provide a separate grounding schematic diagram in accordance with Telecommunications Industry Association (TIA)/ Electronic Industries Alliance (EIA)-606 Administration Standard guidelines for telecommunication system.

### 3.07 GENERAL BRANCH CIRCUITS AND FEEDERS

- A. All conduit systems, equipment housings, material housings, junction boxes, cabinets, motors, ducts, wireways, cable trays, light fixtures, portable equipment and all other conductive surfaces shall be solidly grounded in accordance with the California Electrical Code to form a continuous, permanent and effective grounding system.
- B. Install a separate green grounding conductor in all conduits, including feeder, branch circuit, and flexible; both metallic and non-metallic. The conduit systems shall not be used as the system equipment grounds. Size all grounding conductors per CEC Article 250 unless a larger ground is indicated on the drawings.
- C. All panelboards, junction boxes, pullboxes, wireways and equipment enclosures shall be bonded to the conduit systems.
- D. All building expansion joints shall be bonded.
- E. Isolated ground receptacles shall have both an isolated ground conductor and a separate equipment grounding conductor.

### 3.08 MOTOR CIRCUITS

- A. All motor circuits shall have a ground wire pulled with the phase conductors. The ground wire shall be extended from the panel ground bus and shall be bonded at all junction boxes, pullboxes, disconnect switches, controllers, motor connection boxes, and motor frames. Each motor with a Variable Frequency Drive (VFD) controller shall have a dedicated grounding conductor. Ground these motors back through the VFD controller as recommended by the

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drive manufacturer to eliminate radio frequency interference. Also, the wiring between the VFD controller and the motor shall be in a dedicated conduit.

### **3.09 EQUIPMENT ROOM GROUND TERMINAL BAR**

- A. Mount bar by anchors and bolts using 1-1/2 inch long segments of 1/2 inch rigid conduit as spacer between bar and wall. Use a minimum of two supports, 18 inches on center. Connect all grounding electrode system conductors, system enclosure ground bus, and other indicated electrode systems to the terminal bar. Each telecom/his room shall have a ground bar with a minimum of six lugs or screws. Interconnect telecom/his ground bars to building steel with No. 6 AWG insulated copper conductor.

### **3.10 FLEXIBLE RACEWAY GROUNDING**

- A. Install a ground conductor inside all flexible raceways (e.g. flexible steel, liquid tight). Bond the conductor to the enclosure or ground bus in the nearest box or access on either side of the flexible section. Size conductor as specified, indicated or required by code, whichever is larger.

### **3.11 GENERAL GROUNDING REQUIREMENTS**

- A. All ground connectors shall be bronze of the clamp type. All clamp accessories such as bolts, nuts, and washers shall also bronze to assure a permanent corrosion-resistant assembly. Connector shall be as manufactured by Burndy Engineering Company, IlSCO Corporation, or equal. Make connections easily accessible for inspection, underground or concealed in floors or walls.
- B. All ground cable splices, joints, and connections to ground rods shall be made with an exothermic welding process which shall provide a weld with current-carrying capacity not less than that of the conductors welded. Soldered connections shall not be used.
- C. All ground wire shall be insulated, unless otherwise indicated on the Drawings, extra flexible stranded copper cables. Grounding cables installed in earth shall be laid slack.
- D. Neutrals throughout the system shall be solidly grounded.
- E. Lighting and power panelboards shall be grounded by connecting a grounding conductor to the grounding stud and to the incoming and outgoing feeder conduits grounding bushings. Each grounding-type bushing shall have the maximum ground wire accommodation available in standard manufacturer for the particular conduit size. Connection to the bushing shall be with wire of this maximum size.
- F. The equipment for the fire protection alarm system shall have its grounding terminal connected to the ground lug on the panelboard serving the system by means of a #6 green coded insulated conductor, run in 3/4 inch steel conduit, utilizing a ground clamp.

**END OF SECTION 26 05 26**

**SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide electrical materials, installation and testing for the site improvements and new building.

**1.02 DESCRIPTION**

- A. This section describes requirements for supporting devices.

**1.03 RELATED WORK**

- A. Section 26 01 00: General Requirements for Electrical Work.

**1.04 SUBMITTALS**

- A. Procedure: Submit under provisions of Division 1 – General Conditions.
- B. Provide submittals for items listed documenting compliance with specification requirements.
- C. Product Data:
  - 1. Electrical Materials: Manufacturer's current published catalog sheets.

**PART 2 - PRODUCTS**

**2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
  - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
  - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 1.5. Include consideration for vibration, equipment operation, and shock loads where applicable.
  - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  - 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
  - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
  - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

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1. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
  1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

## 2.02 SUPPORTING DEVICES

- A. Conduit Supports:
  1. Straps, one hole galvanized or cadmium plated iron, T & B, Efcor, Appleton, or equal.
  2. Clamp backs, nest backs, galvanized iron or cadmium-plated steel, Efcor, OZ, Steel City, or equal. Plumbers perforated strap, not acceptable.
  3. Hanger Rod, 3/8-inch, minimum galvanized all-thread rod.
- B. Conduit Racks:
  1. Framing Channel, steel, hot-dip galvanized or electroplated, Kindorf, Unistrut, Superstrut, or equal.
  2. Channels attached to building or structure surfaces, 14 gauge, 1-5/8 inches wide by 13/16 inches deep. Other channels, 12 gauge minimum, 1-5/8 inches wide by 1-5/8 inches deep, minimum.
  3. Construct racks to limit deflection to 1/360 of span.
  4. Load on trapeze, rod type hangers, concrete inserts and beam clamps, not to exceed 700 pounds per hanger. Provide rigid frames if load exceeds 700 pounds per hanger.
- C. Outlet Boxes
  1. Attach device boxes with adjustable bar type hangers screw fastened to two stud/ceiling joists on both sides of box.
- D. Anchor Methods:
  1. Hollow masonry anchors.
  2. Solid masonry, malleable iron expansion anchors or preset inserts.
  3. Metal surfaces, machine screws, bolts or welded studs.
  4. Wood surfaces, wood screws.
  5. Concrete surfaces or self-drilling anchors.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

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- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

**END OF SECTION 26 05 29**

**SECTION 26 05 33.16 - BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide electrical materials, installation and testing for the site improvements and new building.

**1.02 DESCRIPTION**

- A. This section describes requirements for outlet boxes.

**1.03 RELATED WORK**

- A. Section 26 01 00: General Requirements for Electrical Work.

**1.04 REFERENCE STANDARDS**

- A. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.
- B. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008.
- C. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; National Electrical Manufacturers Association; 2008.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

**1.05 SUBMITTALS**

- A. Procedure: Submit under provisions of Division 1 – General Conditions.
- B. Provide submittals for items listed documenting compliance with specification requirements.
- C. Product Data:
  - 1. Electrical Materials: Manufacturer's current published catalog sheets.

**PART 2 - PRODUCTS**

**2.01 BOXES**

- A. General Requirements:
  - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
  - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.

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3. Use suitable concrete type boxes where flush-mounted in concrete.
  4. Use suitable masonry type boxes where flush-mounted in masonry walls.
  5. Use raised covers suitable for the type of wall construction and device configuration where required.
  6. Use shallow boxes where required by the type of wall construction.
  7. Do not use "through-wall" boxes designed for access from both sides of wall.
  8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
  10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
  11. Boxes for Ganged Devices: Use multi-gang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
  12. Wall Plates: Comply with Section 26 27 26.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  2. NEMA 250 Environment Type, Unless Otherwise Indicated:
  3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
- D. Cast Boxes: NEMA FB 1, Type FD, cast ferrous alloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

## 2.02 OUTLET BOXES

- A. Construction: Deep drawn or fabricated interlocked flat pieces with welded tabs, electro-galvanized sheet steel with electro-galvanized hardware. Do not use sectional boxes.
- B. Size: To accommodate the required number and sizes of conduits, wires, splices and devices but not smaller than the size indicated or specified.
- C. Plaster Ring: Provide flush with wall or ceiling finish, except where otherwise indicated or specified.
- D. Device Boxes: For single switches and receptacles, provide boxes not less than 4 inches square by 1-1/2 inches deep. For 2 devices, provide boxes not less than 4-11/16 inches square by 1-1/2 inches deep.
- E. Telecommunications Boxes: No less than 4-11/16 inches square by 2 inches deep.
- F. Special Mounting: In cabinets, tile, concrete block, brick, stone, wood or similar material, provide rectangular boxes with square corners and straight sides. For single devices, provide boxes 4 inches high by 2-1/2 inches wide by 3-3/8 inches deep. For 2 or more devices, provide multi-gang, non-sectional box with tile or masonry ring.
- G. Lighting Fixtures: 4-inch octagon by 2-1/8 inch deep, minimum. Fit boxes for surface or pendant mounted fixtures with 3/8-inch malleable iron fixture stud.



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- H. Attach device boxes with adjustable bar type hangers screw fastened to two stud/ceiling joists on both sides of box.

**2.03 PULL AND JUNCTION BOXES**

- A. General: For all pull and junction boxes over 300 cubic inches, provide code gauge, sheet steel boxes which meet NEMA 1 standards for panelboard and terminal cabinet box construction, with screw type covers.
- B. Ground Lug: Weld, before finish is applied, a grounding pad drilled for two bolted grounding lugs or two ground studs on the box interior.
- C. Finish: Apply rust inhibiting prime coat and 2 coats of baked enamel, standard factory gray.
- D. Hardware: Cadmium plated steel screws.

**2.04 PRECAST CONCRETE BOXES**

- A. Provide high-density reinforced concrete pull and junction boxes with end and side knockouts as manufactured by Christy, Forni, Brooks, or approved equal. Fabricated boxes with non-settling shoulders to facilitate maintaining grade during backfilling. Unless noted otherwise, provide galvanized steel checker plate covers with hold-down bolts, identified as follows:
- B. System Identification
- C. Power - 600 volts or less Electrical

**PART 3 - EXECUTION**

**3.01 BOXES AND CABINETS**

- A. Place outlet boxes in a location as close to that shown on the plans as possible. Coordinate location of boxes with other Divisions.
- B. Install wall mounted outlet boxes so that the distance from the centerline of the box to finished floor is as listed or indicated:
  - 1. Receptacles, + 1 foot-6 inches
  - 2. Telephone, + 1 foot-6 inches
  - 3. Data, + 1 foot-6 inches
  - 4. Switches, + 3 feet-9 inches
- C. Install junction boxes with covers in concealed areas accessible after installation. Do not install junction boxes flush with finish walls or ceilings unless specifically approved by the Engineer.
- D. Attach surface boxes with:
  - 1. Steel or malleable iron expansion anchors in concrete or solid masonry.
  - 2. Wood screws in wood.
  - 3. Toggle bolts in hollow walls or masonry.
  - 4. Machine screws, bolts or welded studs in steel.
- E. Attach flush boxes with adjustable bar type hangers screw fastened to studs on both sides of the box.

**END OF SECTION 26 05 33.16**

**SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Extent of electrical identification work is as outlined by this specification.
- B. Types of electrical identification work specified in this section include the following:
  - 1. Buried cable warnings.
  - 2. Electrical power, control, and communication conductors.
  - 3. Operational instructions and warnings.
  - 4. Danger signs.
  - 5. Equipment/system identification signs.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 01 00: General Requirements for Electrical Work.

**1.03 QUALITY ASSURANCE**

- A. California Electrical Code (CEC) Compliance: Comply with CEC as applicable to installation of identifying labels and markers for wiring and equipment.
- B. Underwriters Laboratories, Inc. (UL) Compliance: Comply with applicable requirements of UL Standard 969, "Marking and Labeling Systems", pertaining to electrical identification systems.
- C. American National Standards Institute (ANSI) Compliance: Comply with applicable requirements of ANSI Standard A13.1, "Scheme for the Identification of Piping Systems".
- D. National Electrical Manufacturer's Association (NEMA) Compliance: Comply with applicable requirements of NEMA Standard No's WC-1 and WC-2 pertaining to identification of power and control conductors.

**1.04 SUBMITTALS**

- A. Product Data: Submit manufacturer's data on electrical identification materials and products.
- B. Samples: Submit samples of each color, lettering style and other graphic representation required for each identification material or system.

**PART 2 - PRODUCTS**

**2.01 IDENTIFICATION REQUIREMENTS**

- A. Identification for Equipment:
  - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
  - 2. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
    - a. Service equipment.
    - b. Electrical distribution equipment.
    - c. Industrial control panels.
- B. Identification for Conductors and Cables:

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1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

**2.02 WARNING SIGNS AND LABELS**

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
  1. Materials:
  2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.
- C. Warning Labels:
  1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
  2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
  3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

**2.03 ACCEPTABLE MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide electrical identification products of one of the following (for each type marker):
  1. Almetek,
  2. Brady, W.H. Company,
  3. Calipico Inc.,
  4. Cole-Flex Corporation,
  5. Direct Safety Company,
  6. George-Ingraham Corporation,
  7. Griffolyn Company,
  8. Ideal Industries, Inc.,
  9. LEM Products, Inc.,
  10. Markal Company,
  11. National Band and Tag Company,
  12. Panduit Corporation,
  13. Seton Name Plate Company,
  14. Tesa Corporation,
  15. Or equal.

**2.04 ELECTRICAL IDENTIFICATION MATERIALS**

- A. Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, provide single selection for each application.

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- B. Color-Coded Plastic Tape:
  - 1. Provide manufacturer's standard self-adhesive vinyl tape not less than 3 mils thick by 1-1/2 inches wide.
    - a. Colors: Unless otherwise indicated or required by governing regulations, provide orange tape.
- C. Underground-Type Plastic Line Marker:
  - 1. Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6 inches wide x 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried cable.
- D. Cable/Conductor Identification Bands:
  - 1. Provide manufacturer's standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type, either pre-numbered plastic coated type, or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identification.
- E. Plasticized Tags:
  - 1. Manufacturer's standard pre-printed or partially pre-printed accident-prevention and operational tags, of plasticized card stock with matte finish suitable for writing, approximately 3-1/4 x 5-5/8 inches, with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary wording, e.g., DANGER, CAUTION, DO NOT OPERATE.
- F. Self-Adhesive Plastic Signs:
  - 1. Provide manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application, e.g., 208V, EXHAUST FAN, RECTIFIER.
- G. Colors: Unless otherwise indicated, or required by governing regulations, provide white signs with black lettering.
- H. Baked Enamel Danger Signs:
  - 1. General: Provide manufacturer's standard DANGER signs of baked enamel finish on 20-gauge steel; of standard red, black and white graphics; 14 x 10 inches size except where 10 x 7 inches is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation wording, e.g., HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH.
- I. Engraved Plastic-Laminate Signs:
  - 1. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, black face and white core plies (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
  - 2. Thickness: 1/8 inch, except as otherwise indicated.
  - 3. Fasteners: Self-tapping stainless-steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

## 2.05 LETTERING AND GRAPHICS

- A. General: Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified, or scheduled. Provide

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numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer, or as required for proper identification and operation/maintenance of electrical systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers.

### **PART 3 - EXECUTION**

#### **3.01 APPLICATION AND INSTALLATION**

##### **A. General Installation Requirements:**

1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions, and requirements of CEC and OSHA.
2. Coordination: Where identification is to be applied to surfaces which require finish, install identification after completion of painting.
3. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.

##### **B. Conduit Identification:**

1. Where electrical conduit is exposed in spaces with exposed mechanical piping which is identified by color-coded method, apply color-coded identification on electrical conduit in manner similar to piping identification. Except as otherwise indicated use white as coded color for conduit.

##### **C. Box Identification:**

1. After completion, using an indelible wide tip marker, indicate on the cover of each junction and pull box the designation of the circuits contained therein, i.e., A-1, 3, 5. Use a black marker for normal power circuits a red marker for critical circuits, an orange marker for life safety circuits, and a green marker for equipment circuits.
2. All junction and pull boxes for wiring systems above 600V shall be identified with high voltage warning labels installed every 20 linear feet in accordance with OSHA standards. All boxes shall also be painted red, see Section 09900 of the specifications.
3. All junction and pull boxes for the fire alarm system shall be painted red. All raceway for the fire alarm system shall be labeled "Fire Alarm" in red letters on intervals not to exceed ten feet.

##### **D. Underground Cable Identification:**

1. During back-filling of each exterior underground electrical, signal or communication conduits, install continuous underground-type plastic line marker, located directly over buried line at 6 to 8 inches below finished grade. Where multiple small lines are buried in a common trench and do not exceed an overall width of 16 inches, install a single line marker.
2. Install line marker for every buried conduit.

##### **E. Cable/Conductor Identification:**

1. Apply cable/conductor identification, including voltage, phase and feeder number, on each cable/conductor in each box/enclosure/cabinet where wires of more than one circuit or communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project's electrical work. Refer to Section 16100 - Basic Materials and Methods of these specifications for color coding requirements.

##### **F. Operational Identification and Warnings:**

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1. Wherever required by OSHA or directed by the Owner's Representative, to ensure safe and efficient operation and maintenance of electrical systems, including prevention of misuse of electrical facilities equipment by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes. Request a meeting with the Owner's Representative prior to substantial completion to coordinate warning requirements.

G. Danger Signs:

1. In addition to installation of danger signs required by governing regulations and authorities, install appropriate danger signs at locations identified by the Owner's Representative as constituting similar dangers for persons in or about project. Request a meeting with the Owner's Representative prior to substantial completion to coordinate danger sign requirements.
  - a. High Voltage: Install danger signs wherever it is possible, under any circumstances, for persons to encounter electrical power of voltages higher than 110-120 volts.
  - b. Critical Switches/Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

H. Equipment/System Identification:

1. Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication/control/signal systems unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2 inch high lettering, on 1-1/2 inch high sign (2 inch high where 2 lines are required), white lettering in black field. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work:
  - a. Electrical cabinets and enclosures.
  - b. Access panel/doors to electrical facilities.
  - c. Transformers.
  - d. Fire alarm control panel, battery cabinets, voice alarm system cabinets, and transponders.
  - e. Automatic transfer switches/UPS/Emergency Lighting Invertors/HVAC battery backup.
2. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate. Identification of flush mounted cabinets and panelboards shall be on the inside of the device.
3. Panelboards, individually mounted circuit breakers, and each breaker in the switchboards, and distribution panels shall be identified with an engraved plastic laminate sign. Plastic nameplates shall be black laminated plastic with faceplate and white core. Lettering shall be engraved minimum 1/4 inch high letters.
  - a. Equipment identification is to indicate the following:

- 1) Equipment ID abbreviation.
- 2) Voltage, phase, wires and frequency.
- 3) Emergency or other system.
- 4) Power source origination.
- 5) Example:
  - (a) Panel GLSH1
  - (b) 208/120V, 3 phase, 4 wire
  - (c) (d) Fed by GLSD1
- b. Submit complete schedule with the shop drawings listing all nameplates and information contained thereon.

**END OF SECTION 26 05 53**

**SECTION 26 08 00 - ELECTRICAL COMMISSIONING REQUIREMENTS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The purpose of this section is to specify the Contractor's responsibilities and participation in the commissioning process relative to division 26.
- B. The commissioning process is primarily the responsibility of the Commissioning Authority, with support for start-up, testing, and commissioning the responsibility of the Contractors. The commissioning process does not relieve the Contractor from participation in the process, or diminish the role and obligations to complete all portions of work in a satisfactory and fully operational manner.
- C. Work of Division 26 includes:
  - 1. Testing and start-up of the electrical equipment.
  - 2. Providing qualified personnel to assist in commissioning tests to verify equipment/ system performance.
  - 3. Completion and endorsement of pre-functional test checklists provided by the Commissioning Authority to assure that Division 26 equipment and systems are fully operational and ready for functional testing.
  - 4. Providing equipment, materials, and labor necessary to correct deficiencies found during the commissioning process which fulfill contract and warranty requirements.
  - 5. Providing training for the systems specified in Division 26 with coordination of owner by the Commissioning Authority.

1.2 RELATED WORK

- A. All testing and start-up procedures and documentation requirements specified within Division 26.
- B. Section 01 91 00 – General Commissioning Requirements
- C. Commissioning functional test procedures that require participation of the Contractors.
- D. Cooperate with the Commissioning Authority in the following manner:
  - 1. Allow sufficient time before final completion dates so that testing can be accomplished.
  - 2. Provide labor and material to make corrections when required without undue delay.
  - 3. Coordinate all required support of that equipment which is provided to or installed with involvement of Division 23 contractors.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Standard certified test equipment for commissioning shall be provided by the Division 26 Contractor.
- B. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist the Commissioning Authority in the commissioning process.

PART 3 - EXECUTION



**3.1 WORK PRIOR TO COMMISSIONING**

- A. Complete all phases of work so the system can be started, tested, balanced, and otherwise commissioned. Division 26 has temporary power and start-up responsibilities with obligations to complete systems, including all sub-systems so they are functional. This includes the complete installation of all equipment and materials per the contract documents and related directives, clarifications, change orders, etc.
- B. The Commissioning Authority will develop a Commissioning Plan. Upon request of the Commissioning Authority, the Contractor shall provide assistance and consultation. The Commissioning Plan will be developed prior to completion of the installation. The Contractor is obligated to assist the Commissioning Authority in preparing the Commissioning Plan by providing all necessary information pertaining to the actual equipment and installation.
- C. Specific pre-commissioning responsibilities of Division 26 are as follows:
  - 1. Normal start-up services required to bring each system into a fully operational state. The Commissioning Authority will not begin the commissioning process until each system is complete and documented, including normal contractor start-up.
  - 2. The Contractor shall perform pre-functional tests on the equipment and systems as noted in section 01 91 00 General Commissioning Requirements.
  - 3. Contractor start-up forms may be substituted for the pre-functional test forms with prior approval by the Commissioning Authority.
  - 4. Pre-functional test forms will be kept in the Contractors job trailer in a Commissioning Field Notebook provided by the Commissioning Authority.
  - 5. Factory start-up services will be provided for key equipment and systems specified in Division 26. The Contractor shall coordinate this work with the manufacturer and the Commissioning Authority.
- D. Commissioning is intended to begin upon completion of a system. Commissioning may proceed prior to the completion of systems and/or sub-systems, if expediting this work is in the best interests of the Owner. Commissioning activities and schedule will be coordinated with the Contractor. Start of commissioning before system completion will not relieve the Contractor from completing those systems as per the schedule.
- E. The Commissioning Online Folder will be used to identify and track all pertinent commissioning documentation required during the Installation phase. This Online Folder will be assembled by the Commissioning Authority and maintained by the Contractor. The Online Folder provides a central location for the Commissioning Authority to identify, copy and organize all pertinent information and will include the following format:
  - 1. Summary describing Notebook contents and use.
  - 2. Copy of Commissioning Plan for contractor field reference.
  - 3. Listing of all specification documentation requirements listed by specification section, with sign off spots for appropriate contractors.
  - 4. Tabs for each specification section with copies of pre-functional test check sheets provided by coordination of subcontractors and Commissioning Authority for contractor completion and space for related contractor-supplied documents.
  - 5. Prior to functional testing the Commissioning Authority will use this book to verify that all appropriate contractors have completed their work and signed off that they have done so. Once the Commissioning Authority is satisfied that all components of a system are complete functional testing will begin.

**3.2 PARTICIPATION IN COMMISSIONING**

- A. Provide skilled technicians to start up and debug all systems within the division of work. These same technicians shall be made available to assist the Commissioning Authority in completing the commissioning program as it relates to each system and their technical specialty. Work schedules, time required for testing, etc., will be requested by the Commissioning Authority and coordinated by the Contractor. Contractor will ensure the qualified technician(s) are available and present during the agreed-upon schedules and of sufficient duration to complete the necessary tests, adjustments, and/or problem resolutions.
- B. The Commissioning Authority reserves the right to judge the appropriateness and qualifications of the technicians relative to each item of equipment, system, and/or sub-system. Qualifications of technicians include expert knowledge relative to the specific equipment involved, adequate documentation and tools to service/commission the equipment, and an attitude/willingness to work with the Commissioning Authority to get the job done. A liaison or intermediary between the Commissioning Authority and qualified factory representatives does not constitute the availability of a qualified technician for purposes of this work.

### 3.3 WORK TO RESOLVE DEFICIENCIES

- A. Maladjustments, misapplied equipment, and/or deficient performance under varying loads will result in a system that does not meet the original design intent. Correction of work will be completed under the direction of the Architect, with input from the Contractor, equipment supplier, and Commissioning Authority. Whereas all members will have input and the opportunity to discuss, debate, and work out problems, the Architect/Engineer of Record will have final jurisdiction on the necessary work to be done to achieve performance and or design intent.

### 3.4 ADDITIONAL COMMISSIONING

- A. Additional commissioning activities may be required after system adjustments, replacements, etc., are completed. The Contractor, suppliers, and Commissioning Authority shall include a reasonable reserve to complete this work as part of their standard contractual obligations.

### 3.5 SEASONAL COMMISSIONING AND OCCUPANCY VARIATIONS

- A. Seasonal commissioning pertains to testing under full-load conditions during peak heating and peak cooling seasons, as well as part-load conditions in the spring and fall. Initial commissioning will be done as soon as contract work is completed regardless of season. Subsequent commissioning may be undertaken at any time thereafter to ascertain adequate performance during the different seasons.
- B. All equipment and systems will be tested and commissioned in a peak season to observe full-load performance. The Contractor will be responsible to participate in the initial and the alternate peak season test of the systems required to demonstrate performance.
- C. Subsequent commissioning may be required under conditions of minimum and/or maximum occupancy or use. All equipment and systems affected by occupancy variations will be tested and commissioned at the minimum and peak loads to observe system performance. The Contractor will be responsible to participate in the occupancy sensitive testing of systems to provide verification of adequate performance.

### 3.6 TRAINING

- A. The Contractor will be required to participate in the training of the Owner's engineering and maintenance staff for each mechanical system and the related components. Training may be conducted in a classroom setting, with system and component documentation, and suitable classroom training aids, or in the field with the specific equipment. The type of training will be per the Owner's option.

- B. Training will be conducted jointly with the Commissioning Authority, the design engineers, the equipment vendors, and the Contractor. The Contractor will be responsible for the generic training, as well as instructing the Owner's staff on the system peculiarities specific to this project.

**3.7 SYSTEMS DOCUMENTATION**

- A. Contract Documents to incorporate field changes and revisions to system designs to account for actual constructed configurations will be addressed as required in Division 1. All drawings should be red-lined on two sets. Division 26 as-built drawings should include updated architectural floor plans, and the individual electrical systems in relation to actual building layout.
- B. Maintain as-built red-lines on the job site as required in Division 1.
- C. In addition to the stated requirements for operation and maintenance data, provide one copy of equipment technical literature, operation and maintenance literature, and shop drawings to the Commissioning Authority as soon as they are available. This requirement is for review of these documents prior to distribution of multiple copies for the Owner's final use.

**END OF SECTION**

**SECTION 26 0801 - ELECTRICAL ACCEPTANCE TESTING**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. The work required under this section of the specifications consists of the electrical acceptance testing and inspections for all electrical systems and equipment installed or affected by this project. The Contractor shall prepare and submit to the Engineer for review and approval acceptance test procedures and inspection forms in accordance with this specification. A complete functional acceptance test shall be performed on all electrical systems and equipment to prove they perform as intended under all modes of operation. Testing specified in other sections is in addition to testing specified herein. Also the testing will demonstrate the electrical system and equipment operation to the Owner. All labor, materials, rentals, permits and testing equipment or other which is required shall be provided by the Contractor.

**1.02 GENERAL**

- A. The Contractor shall prepare and submit to the Engineer for review and approval acceptance test procedures and inspection forms in accordance with this specification. Testing shall be performed by the Contractor, the manufacturer's representative, and/or a InterCalifornia Electrical Testing Association (NETA) testing company depending on the type of equipment or system being tested as follows:
1. CONTRACTOR
    - a. Cables, Low-Voltage, 600-Volt Maximum
    - b. Switches and Circuit Breakers, Air, Low-Voltage
    - c. Fiber Optic Cable
    - d. Lighting System
    - e. Clock System
    - f. Telecommunications System
    - g. Grounding System
    - h. Low Voltage (600 VAC maximum) Power Distribution System
    - i. Instrument and Control System
  2. MANUFACTURER'S REPRESENTATIVE
    - a. Fire Alarm System
  3. NETA
    - a. Switchgear and Switchboard Assemblies (480VAC, 1000A or greater)
    - b. Ground Fault Protection System
    - c. Circuit Breakers
    - d. Metering Devices
- B. The Contractor shall prepare the test procedures and inspection forms and perform the specified testing and inspections, for the assigned equipment and systems above, as applicable to the equipment and systems installed or affected by the project. If the Contractor (including sub contractors) does not have the ability or qualifications to conduct the required tests then the Contractor will sub contract with a testing organization who does.

- C. The Contractor shall engage in and pay for the services of the Manufacturer's Representative approved testing organizations to provide testing and inspection of the applicable electrical equipment and systems as listed above and specified in this section. The testing organizations may be an independent division or authorized representative of the manufacturer of the assembled products being tested. The Manufacturer's Representative will conduct startup testing and will be part of integrated system testing. If an outside testing organization is approved, a representative of the manufacturer shall be under contract by the testing company. The representative shall be present during all testing to insure that the testing is performed properly and that any deficiencies discovered are promptly corrected. The Manufacturer's Representative will assist in the preparation and performance of other test procedures and inspections such as integrated system testing (e.g., loss of power/generator/ats/ups/annunciator integrated system test)
- D. The Contractor shall engage in and pay for the services of a NETA Accredited Testing Company to provide testing and inspection applicable electrical equipment and systems as listed above and specified in this section. Also, the NETA testing contractor will conduct integrated system testing or other testing as required. NETA testing will be conducted per the current Standard for NETA Acceptance Testing Specification including test report preparation and submittals. Technicians performing these electrical tests and inspections shall be trained and experienced concerning the apparatus and systems being evaluated. These individuals shall be capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved. They must evaluate the test data and make a judgment on the serviceability of the specific equipment. Technicians shall be certified in accordance with the current ANSI/NETA ETT, Standard for Certification of Electrical Testing Personnel. Each on-site crew leader shall hold a current certification, Level III or higher, in electrical testing. The testing organization shall provide the following: A written record of all tests and a final report; All field technical services, tooling, equipment, instrumentation, and technical supervision to perform such tests and inspections; Specific power requirements for test equipment; Notification to the owner's representative prior to commencement of any testing; A written record of all tests and a final report and a timely notification of any system, material, or workmanship that is found deficient based on the results of the acceptance tests. The NETA contractor will assist in the preparation and performance of other test procedures and inspections such as an acceptance testing of the integrated system (e.g., loss of power/generator/ATS/UPS/annunciator integrated system test)
- E. Submit all test reports to the Owners Representative at least two weeks prior to the project final inspection for review.

### 1.03 SAFETY AND PRECAUTIONS

- A. All parties involved must be cognizant of industry-standard safety procedures. This document does not contain any procedures including specific safety procedures. It is recognized that an overwhelming majority of the tests and inspections recommended in these specifications are potentially hazardous. Individuals performing these tests shall be qualified and capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved.
- B. Safety practices shall include, but are not limited to, the following requirements:
  - 1. All applicable provisions of the Occupational Safety and Health Act, particularly OSHA 29 CFR Part 1910 and 29 CFR Part 1926 including OSHA lockout procedures.
  - 2. ANSI/NFPA 70E, Standard for Electrical Safety in the Workplace.
  - 3. Applicable state and local safety operating procedures.
  - 4. Owner's safety practices.
  - 5. A safety lead person shall be identified prior to the commencement of work.

6. A safety briefing shall be conducted prior to the commencement of work.
7. All tests shall be performed with the apparatus de-energized and grounded except where otherwise specifically required to be ungrounded or energized for certain tests.
8. The testing organization shall have a designated safety representative on the project to supervise operations with respect to safety.

#### **1.04 QUALITY ASSURANCE**

- A. The testing and inspection shall comply with all applicable sections of the following codes and standards:
  1. American California Standards Institute - ANSI
  2. American Society for Testing and Materials - ASTM
  3. Association of Edison Illuminating Companies - AEIC
  4. Institute of Electrical and Electronics Engineers - IEEE
  5. Insulated Power Cable Engineers Association - IPCEA
  6. InterCalifornia Electrical Testing Association - NETA Acceptance Testing Specifications
  7. California Electrical Code - CEC
  8. California Electrical Manufacturers Association - NEMA
  9. California Fire Protection Association - NFPA
  10. State and Local Codes and Ordinances
- B. The inspection and testing shall comply with the project plans and specifications as well as with the manufacturer's drawings, instruction manuals, and other applicable data for the apparatus tested.
- C. Review and Approval- All test reports, deficiencies and corrections, test results, shall be reviewed by the Engineer of Record.

#### **1.05 DIVISION OF RESPONSIBILITY**

- A. Perform routine insulation-resistance, continuity, and rotation tests for all distribution and utilization equipment prior to and in addition to tests performed by the testing firm specified herein.
- B. Supply a suitable and stable source of electrical power to each test site. The testing firm shall specify the specific power requirements.
- C. Notify the testing firm when equipment becomes available for acceptance tests. Work shall be coordinated to expedite project scheduling.
- D. Supply a complete set of electrical plans, specifications, and any pertinent change orders to the testing firm prior to commencement of testing.
- E. Notify the Engineer and Owner's Representative prior to commencement of any testing.
- F. Any system, material or installation which is found defective on the basis of acceptance tests shall be reported to the Owner's Representative.
- G. The testing firm shall maintain a written record of all tests and, upon completion of project, shall assemble and certify a final test report for review and approval by the Engineer of Record.

### 1.06 ACCEPTANCE TEST PROCEDURES

- A. The Acceptance Test Procedure shall include the following sections:
  - 1. Purpose of Test
  - 2. References
  - 3. Test Participants- Name/Company/Telephone Number and hand signed Initials
  - 4. Equipment and Systems tested.
  - 5. Description of test.
  - 6. Acceptance Criteria
  - 7. Initial Conditions/Prerequisites
  - 8. Test Equipment and Calibration date
  - 9. Test Procedure and Date of Test
  - 10. Test Results-verification of passing acceptance criteria.
  - 11. Deficiencies, Corrections and Re-test
  - 12. Verification Systems and Equipment are returned to Operational Status
  - 13. Conclusions and recommendations.
  - 14. Appendix, including test forms.
- B. Each piece of equipment shall be recorded in the test procedure listing the condition of the equipment as found and as left. Included shall be recommendations for any necessary repair or replacement parts. The test procedures shall indicate the name of the engineer who tested the equipment and the date of the test completion.
- C. Inspection Reports may be in situ test reports prepared by manufacturer representatives such as startup test reports by, for example the UPS or Generator manufacturers' startup representative. The inspection reports shall indicate the name of the person who inspected the equipment and the date of completion.
- D. The Acceptance Test Procedure shall be a step by step procedure to be followed verbatim and initialed after each step's performance. The test shall include the listed sections above. The procedure shall be prepared on 8.5" x 11" paper. See Attachment 1 as an example.

### 1.07 TESTING INSTRUMENT TRACEABILITY

- A. All applicable test instrumentation shall be currently calibrated within rated accuracy.
- B. The accuracy shall be traceable to the California Bureau of Standards in an unbroken chain.
- C. Instruments shall be calibrated in accordance with the following frequency schedule:
  - 1. Field instruments: 6 months maximum.
  - 2. Laboratory instruments: 12 months.
  - 3. Leased specialty equipment: 12 months
- D. Dated calibration labels shall be visible on all test equipment.

### 1.08 FINAL SETTINGS

- A. The Contractor shall be responsible for implementing all final settings and adjustments of equipment in accordance with manufacturer's and/or Engineer's specified values. The Contractor shall be responsible to request any required setting values from the Engineer.

### 1.09 SUBMITTALS

- A. At least two weeks prior to conducting testing, submit Acceptance Test Procedures and Inspection Reports for review and approval by the Electrical Engineer of Record. This includes the prepared test report outlined above including all systems and equipment to be tested (with the test results, deficiencies, and conclusions sections blank). The Contractor shall be responsible to integrate the testing by the Contractor, Manufacturing Representatives, and NETA testing organization. The NETA testing organization shall prepare the Testing Documents per the current NETA Acceptance Testing Specification and assist the Contractor in preparing an Integrated System Test. The Manufacturing Representative testing organization shall prepare their regular start up test plan and assist the Contractor in preparing an Integrated System Test. After review and approval the test report shall be executed.
- B. At least two week prior to conduction testing, submit for review and approval by the Engineer the list of test participants and prove of their qualifications and demonstrate they have the necessary testing experience and training to conduct the test.
- C. Record copies of the completed test report shall be submitted no more than 30 days after completion of the testing and inspection.

### 1.10 FAILURE TO MEET TEST

- A. Any found defective on the basis of acceptance test shall be reported directly to the Engineer.
- B. Contractor shall replace the defective material or equipment and have test repeated until test proves satisfactory without additional cost to the Owner.

## PART 2 - PRODUCTS-NOT USED

## PART 3 - EXECUTION

### 3.01 EQUIPMENT TO BE TESTED AN INSPECTED

- A. The following equipment shall be tested in accordance with the scopes of work which follow and additional participation in other acceptance testing such as integrated system and functional testing. Acceptance test procedures and inspection reports shall be prepared, submitted and approved prior to performance of testing and inspections. The party responsible is identified in accordance with the following key: C = Contractor/Installer; M = Manufacturer; T = Testing Agency.
  - 1. Molded Case Circuit Breakers - C
  - 2. Fire Alarm System - M
  - 3. Grounding System - C
  - 4. Cables, Low Voltage, 600 Volts Maximum - C
  - 5. Ground Fault Systems - C
  - 6. Low Voltage Switchgear and Switchboards - T
  - 7. Low Voltage Power Circuit Breakers and Insulated Case Circuit Breakers - T
  - 8. Lighting Control System - C
  - 9. Telecommunications Systems-C or M



10. Other Systems-C, M, T

**3.02 INSPECTIONS**

**A. DRY TYPE TRANSFORMERS**

1. Visual and Mechanical Inspection:

- a. With case covers removed, inspect transformer core and coil assembly and enclosure interior. Cloth wipe and brush major insulating surfaces.
- b. Check primary, secondary, and ground connections.
- c. Check tap connections and tap changer.
- d. Inspect all bolted connections. Torque wrench tighten or remake any questionable connections.
- e. Inspect insulators, spacers, and windings.
- f. Inspect for adequate electrical clearance.
- g. Check base or support insulators, including vibration isolation supports.
- h. Check accessory devices for condition and proper operation.
- i. Verify that the transformers have been provided with adequate spacing for ventilation.

**B. MOLDED CASE CIRCUIT BREAKERS**

1. Visual and Mechanical Inspection:

- a. Inspect cover and case, and check for broken or loose terminals.
- b. Operate breaker to check operation.
- c. Verify proper reporting of the events on the project equipment monitoring system

2. Electrical Tests (400 ampere frame and larger):

- a. Insulation Resistance Test: Megger main poles of breaker pole-to-pole, from each pole to ground, and across the open contacts of each pole.
- b. Contact Resistance Test: Ductor across main pole contacts with breaker closed and latched to check for good, low resistance contact.
- c. Test overcurrent trip device and calibrate. Where primary injection testing is specified, test each pole of the breaker individually. Data shall be compared with manufacturer's published data.
  - 1) All trip units shall be tested by primary injection.
  - 2) Static overcurrent trip devices shall be tested per manufacturer's instructions.
  - 3) Test for minimum pick-up current.
  - 4) Apply 300% of pick-up current and measure time necessary to trip breaker (long time delay).
  - 5) Where short time delay characteristics are provided, test short time pick-up and delay.
  - 6) Test instantaneous trip by passing current sufficiently high to trip breaker instantaneously.
  - 7) Where ground fault protection is provided, test ground fault pick-up and delay.

- 8) Check reset characteristics of trip unit.
- 9) Electrically test any auxiliary devices such as shunt trips, undervoltage trips, alarm switches, and auxiliary switches.

C. FIRE ALARM SYSTEM

1. Visual and Mechanical Inspection:
  - a. Inspect each device for physical damage.
  - b. Check for proper labeling of conductors.
  - c. Inspect all test switches for proper operation.
  - d. Inspect all system lamps and LED's for proper operation. Replace all non-operational equipment.
  - e. Check all cabinet doors latches and hinges for proper operation. Adjust, lubricate, and repair as required.
  - f. Verify proper reporting of the events on the project equipment monitoring system.
2. Electrical Tests: Test each individual circuit at panel with equipment connected for proper operation. Entire system shall test free from opens, grounds, and short circuits. Verify control circuit integrity: Field tests to verify component compliance with specifications, adjusting, calibrating, and setting circuit breaker, relays, timers, etc. Testing will include, but not be limited to the following:
  - a. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
  - b. Close each sprinkler system control valve and verify proper supervisory alarm at the FACP.
  - c. Verify activation of all flow switches.
  - d. Open initiating device circuits and verify that the trouble signal actuates.
  - e. Open and short signaling line circuits and verify that the trouble signal actuates.
  - f. Open and short indicating appliance circuits and verify that trouble signal actuates.
  - g. Ground all circuits and verify response of trouble signals.
  - h. Check presence and audibility of all alarm notification devices.
  - i. Check installation, supervision, and operation of all intelligent smoke detectors.
  - j. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
  - k. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.
  - l. Check the integrity of the software program with the system in complete operation. Verify that each message reported is correct with respect to the signal received. All possible operating conditions and system troubles shall be tested. Rewrite software as required.

- m. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
- n. Close each sprinkler system control valve and verify proper supervisory alarm at the FACP.
- o. Verify activation of all flow switches.
- p. Open initiating device circuits and verify that the trouble signal actuates.
- q. Open and short signaling line circuits and verify that the trouble signal actuates.
- r. Open and short indicating appliance circuits and verify that trouble signal actuates.
- s. Ground all circuits and verify response of trouble signals.
- t. Check presence and audibility of all alarm notification devices.
- u. Check installation, supervision, and operation of all intelligent smoke detectors.
- v. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
- w. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.
- x. Check the integrity of the software program with the system in complete operation. Verify that each message reported is correct with respect to the signal received. All possible operating conditions and system troubles shall be tested. Rewrite software as required.

#### D. GROUNDING SYSTEM

- 1. Visual and Mechanical Inspection:
  - a. Inspect wiring system outlet and junction boxes for proper grounding. Green grounding conductor shall be connected to outlet and junction boxes. Inspect a minimum of 5% of project boxes.
  - b. Verify connections of grounds for the secondary of separately derived grounding systems, i.e. at dry type transformers. Note type of connection, i.e. mechanical or exothermic.
  - c. Verify proper connection to all components of building service entrance grounding system. Note all system components which are interconnected and type of connection either mechanical or exothermic. Note depth of driven ground rods.
- 2. Electrical Tests (Small Systems):
  - a. Perform ground-impedance measurements utilizing the fall-of-potential method per ANSI/IEEE Standard 81 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System". Instrumentation utilized shall be specifically designed for ground impedance testing. Provide sufficient spacing so that plotted curves flatten in the 62% area of the distance between the item under test and the current electrode.
  - b. Equipment Grounds:

- 1) Utilize two-point method of IEEE Std. 81. Measure between equipment ground being tested and known low-impedance grounding electrode or system.
3. Electrical Tests (Large Systems):
  - a. When sufficient spacing of electrodes described above is impractical, perform ground-impedance measurements utilizing either the intersecting curves method or the slope method. (Ref. Nos. 40 and 41 in IEEE Std. 81.)
  - b. Test Values:
    - 1) The main ground electrode system impedance-to-ground should be no greater than five (5) ohms. Equipment grounds, depending on size and length of grounding conductor, should be only fractionally higher than system ground.
- E. CABLES - LOW-VOLTAGE - 600V MAXIMUM
  1. Visual and Mechanical Inspection:
    - a. Inspect cables for physical damage and proper connection in accordance with single-line diagram.
    - b. Test cable mechanical connections to manufacturer's recommended values using a calibrated torque wrench.
    - c. Check cable color-coding with applicable specifications and California Electrical Code standards.
  2. Electrical Tests:
    - a. Perform insulation-resistance test on each feeder on the riser diagram with respect to ground and adjacent conductors. Applied potential shall be 1000 volts dc for 1 minute.
    - b. Perform continuity test to insure proper cable connection.
    - c. Test Values:
      - 1) Evaluate results by comparison with cables of same length and type. Investigate any values less than 50 megohms.
      - 2) Provide a test report for each feeder which indicates the manufacturer's target values and actual test reading. Report shall indicate pass/fail for each feeder. Submit report to Owner's Representative for approval. Include test report in project maintenance manual.
    - d. Feeder Cables:
      - 1) 600-volt feeder cables in the building and secondary service cables to the building shall be tested using a megohmmeter, to measure the insulation resistance of each conductor in the circuit.
      - 2) Disconnect all equipment switches, relays, buswork, transformers, etc.) from the cable being tested.
      - 3) Tests to be performed in a dry area.
      - 4) Clean and dry cable ends with a cloth moistened with a suitable solvent.
    - e. e.Cable Values: Cable values shall be established and provided by the cable manufacturer. Provide target value insulation resistance (IR) in megohms, based on 1000 ft. at 60 Deg F.

- f. Temperature Correction Factor: For temperatures above or below 60°F, a correction factor may have to be applied to determine the true IR value. However, if the measured IR of the system is equal to or greater than the calculated value, a correction factor is not needed.
  - g. Correct insulation deficiencies which show and insulation resistance of less than one megohm.
  - h. Test conductors with power off and impress a voltage of not less than 500 volts D.C.
  - i. Perform continuity tests on all conductors.
- F. GROUND-FAULT SYSTEMS (CEC 230-95)
- 1. Visual and Mechanical Inspection:
    - a. Inspect for physical damage and compliance with drawings and specifications.
    - b. Inspect neutral main bonding connection to assure:
      - 1) Zero-sequence sensing system is grounded.
      - 2) Ground-strap sensing systems are grounded through sensing device.
      - 3) Ground connection is made ahead of neutral disconnect link on zero-sequence sensing systems.
      - 4) Grounded conductor (neutral) is solidly grounded.
    - c. Inspect control power transformer to ensure adequate capacity for system.
    - d. Manually operate monitor panels (if present) for:
      - 1) Trip test.
      - 2) No trip test.
      - 3) Nonautomatic reset.
    - e. Record proper operation and test sequence.
    - f. Set pickup and time-delay settings in accordance with the settings provided by the University's Representative.
    - g. Verify proper reporting of the events on the project equipment monitoring system.
  - 2. Electrical Tests:
    - a. Measure system neutral insulation to ensure no shunt ground paths exist. Remove neutral-ground disconnect link. Measure neutral insulation resistance and replace link.
    - b. Determine the relay pickup current by current injection at the sensor and operate the circuit interrupting device.
    - c. Test the relay timing by injecting three hundred percent (300%) of pickup current, or as specified by manufacturer.
    - d. Test the system operation at fifty-seven percent (57%) rated control voltage, if applicable.
    - e. Test zone interlock systems by simultaneous sensor current injection and monitoring zone blocking function.

- f. On multiple source, tie breaker, etc., systems, devise a simulation scheme that fully proves correct operation.
- g. Test Parameters:
  - 1) System neutral insulation shall be a minimum of one hundred (100) ohms, preferably one (1) megohm or greater.
  - 2) Relay timing shall be in accordance with manufacturer's published time-current characteristic curves but in no case longer than one (1) second for fault currents equal to or greater than 3,000 amperes.
  - 3) Relay pickup value shall be within +10% of setting and in no case greater than 1200A.

G. LOW VOLTAGE SWITCHBOARDS

- 1. Visual and Mechanical Inspection:
  - a. Verify that the enclosure interiors have been cleaned of accumulated dust, dirt, oil films, and other foreign materials.
  - b. Inspect all electrical and mechanical components for condition and any evidence of defects or failure.
  - c. Check for proper travel and alignment of any drawout or plug-in circuit breakers.
  - d. Check breaker connections to bus.
  - e. Inspect bolted connections. Torque wrench tighten or remake any questionable connections.
  - f. Inspect for missing or loose hardware or accessories.
  - g. Inspect ground bus connections.
  - h. Operate key and door interlock devices to assure proper operation.
  - i. Verify proper reporting of the events on the project equipment monitoring system.
- 2. Electrical Tests:
  - a. Insulation Resistance Test: Megger main secondary bus and feeder circuits phase-to-phase and phase-to-ground.
  - b. Energize any space heater circuits to insure proper operations.
  - c. Check phase rotation with a Biddle phase rotation meter.
  - d. Instruments and Meter Tests:
    - 1) Inspect panel mounted instruments and meters. Clean and check for calibration accuracy. Make minor adjustments as necessary.

H. LOW VOLTAGE POWER CIRCUIT BREAKERS AND INSULATED CASE CIRCUIT BREAKERS

- 1. Visual and Mechanical Inspection:
  - a. Remove each draw-out type circuit breaker.
  - b. Inspect arc chutes of power circuit breakers.
  - c. Inspect circuit breaker for defects or damage.

- d. Inspect and check contacts. Check alignment, over-travel, and pressure. Adjust if necessary.
  - e. Inspect finger clusters on line and load stabs of draw-out circuit breakers.
  - f. Check for proper mechanical operation. Lubricate where necessary.
  - g. Check auxiliary devices for proper operation.
  - h. Check breaker racking device (if applicable) for alignment and friction-free operation. Lubricate if necessary.
  - i. Verify proper reporting of the events on the project equipment monitoring system.
2. Electrical Tests:
- a. Insulation Resistance Test: Megger main poles of breaker pole-to-pole, from each pole to ground, and across the open contacts of each pole.
  - b. Contact Resistance Test: Ductor across main pole contacts with breaker closed and latched to check for good, low resistance contact.
  - c. Test overcurrent trip device by primary injection and calibrate to settings provided. Static overcurrent trip devices shall be tested per the manufacturer's instructions. Test each pole of the breaker individually. Data shall be compared with manufacturer's published data.
    - 1) Test for minimum pick-up current.
    - 2) Apply 300% of pick-up current and measure time necessary to trip breaker (long time delay).
    - 3) Where short time delay characteristics are provided, test short time pick-up and delay.
    - 4) Test instantaneous trip by passing current sufficiently high to trip breaker instantaneously.
    - 5) Where ground fault protection is provided, test ground fault pick-up and delay.
    - 6) Check reset characteristic of trip unit.
  - d. Electrically test any auxiliary devices such as shunt trips, undervoltage trips, alarm contacts, and auxiliary contacts.

#### I. LIGHTING CONTROL SYSTEM

1. Visual and Mechanical Inspection:
- a. Inspect each device for physical damage.
  - b. Check for proper labeling of conductors.
  - c. Inspect all system lamps and LED's for proper operation. Replace all non-operational equipment.
  - d. Check all cabinet doors, latches, and hinges for proper operation. Adjust, lubricate, and repair as required.
2. Electrical Tests:
- a. Verify the absence of unwanted voltages between circuit conductors and ground that would constitute a hazard or prevent proper system operation.

- b. Meggar test all conductors (other than those intentionally grounded) for isolation from ground.
- c. Test all conductors (other than those intentionally connected together) for conductor-to-conductor isolation using as insulation testing device.
- d. The control unit shall be tested to verify it is in the proper operating condition as detailed in the manufacturer's manual.
- e. Each control circuit shall be tested to confirm proper operation of the circuit. Monitor the system with all building equipment energized, such as variable speed controllers, to verify the absence of control inhibiting electrical noise.

**END OF SECTION**



**SECTION 26 09 23 - LIGHTING CONTROLS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. This section describes requirements for lighting control equipment.

**1.03 RELATED REQUIREMENTS**

- A. Section 26 01 00: General Requirements for Electrical Work.
- B. Section 26 51 00: Interior Luminaires.

**1.04 REFERENCE STANDARDS**

- A. The Underwriters Laboratory, Inc. (UL).
- B. National Electrical Manufacturers Association (NEMA).

**1.05 SUBMITTALS**

- A. Procedure: Submit under provisions of Division 1 – General Conditions.
- B. Manufacturers Data:
  - 1. Lighting Control Equipment.
- C. Shop Drawings:
  - 1. Lighting Control Equipment.

**1.06 QUALITY ASSURANCE**

- A. Operational Test:
  - 1. Perform an operational test to assure that the installation complies with all requirements of the Specifications. Test shall be made in the presence of the Engineer.
  - 2. If any part of the system fails the test, it must be corrected and the test repeated until it satisfactorily passes the test.
- B. Training:
  - 1. Provide manufacturer's system training necessary for the Owner's personnel. The scope of training should include training sequences available at the job site.
  - 2. The number of persons attending the system training courses shall be determined by the Owner's Representative. The training at the job site shall be provided prior to system approval by the Owner's Representative.
  - 3. System operating training shall be given by an experienced and competent manufacturer's representative qualified with the lighting control system. Training shall occur after lighting control install and commissioning.
  - 4. Minimum four (4) hour training on site. Coordinate time and location with Owner. Provide one (1) month notice.

**PART 2 - PRODUCTS**

**2.01 LIGHTING CONTROL EQUIPMENT**

- A. Electronic Time Switch

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1. Provide 16-circuit electronic time switch of the solid state digital type capable of distributing set points on independent daily schedules throughout a 7 day time period.
2. Provide time switch capable of the following:
  - a. 5 weekday programming, 2 weekend day programming or all 7 day programming to simplify program entry for typical 5/2 day load control.
  - b. Copy feature for duplicating full daily schedules where the 5/2 day scheduling is not applicable.
  - c. Time set points programmable to the nearest minute with a minimum ON duration of 1 minute and a maximum of 6 days, 23 hours and 59 minutes.
  - d. Digital LED readout and prompt LEDs for each function to further simplify program entry.
  - e. For each load control include an ON/OFF pushbutton, an ENABLE/DISABLE switch and an LED load status indicator.
  - f. Operating temperature range of 40° F (40° C) to 122° F (50° C).
  - g. Astronomic programming and momentary or interval programming for any or all circuits independently.
  - h. Astronomic control which automatically calculates center of time zone at times for both sunrise and sunset, and allow user selectable offset of actual times.
  - i. Pulse output programmable for any duration of 1-127 seconds and interval output for up to 6 days, 23 hours and 59 minutes.
  - j. Interval output which provides for user selectable override to turn load(s) on for a limited programmed time period up to 6 days, 23 hours and 59 minutes.
  - k. Full year control by providing automatic leap year and daylight saving time adjustment. Provide user selectable override for states not observing daylight saving time. Provide holiday or special day control requirements by providing up to 99 holiday schedules. Provide holiday schedules programmable for a single day or any duration as required. Provide each holiday schedule with automatic no load activity, independently programmable for a unique load schedule if required.
  - l. Provide a non volatile memory to maintain all program data for the life of the time switch without the need for battery backup. Provide the time switch with a factory installed lithium battery backup which shall maintain clock time and calendar data for 8 years minimum. Provide single coin cell backup, user replaceable without removing the field wiring.
  - m. Time switch logic control circuitry, isolated and shielded to prevent EMI and RFI interference, for reliable operation in electrically noisy environments. For the power board circuitry provide protection for transients up to 6,000 volts.
  - n. Provide control times accurate to the minute and synchronized to the 50 or 60 Hz input. Provide user selectable 12 hour AM/PM or 24 hour clock formats.
  - o. Local or remote selection of load override. Remote override shall be initiated by a momentary or maintained switch closure connected to the time switch override connections using bell wire up to 1,000 feet. Provide override terminals to allow independent override selection in addition to independent to the minute override durations for all outputs.
3. Enclosure: Lockable steel NEMA 1 enclosure.

4. Minimum 8 relays.
  5. Roof mounted photocell.
  6. Connectivity to the Owners LAN.
- B. Low Voltage Lighting Controls:
1. Provide Watt Stopper equal. Install transformers, rectifiers and associated relays in barriered relay cabinets.
  2. Provide switches, relays, and transformers to accomplish switching control indicated on the plan. Provide number and size as required for the system installed. Install size per manufacturer's published printed instructions.
  3. Provide equipment as follows: (Part number Watt Stopper)
    - a. Room Controllers: LMRC213, LMRC212, LMRC211, LMPL101
    - b. Occupancy Sensors: LMDC100, DT-300, other depend on space.
    - c. Daylight Sensors: LMLS500
    - d. Switches: LMSW-108, LMSW-101, LMDM-101, DW-200, DW-100
    - e. Power Pack: BZ-150
    - f. Control Cable: Pere manufacturer requirements.

### **PART 3 - EXECUTION**

#### **3.01 LIGHTING CONTROL EQUIPMENT**

- A. Mount lighting control equipment in a terminal cabinet, flush on surface as indicated. Mount cabinet so that top is 6 feet 6 inches above finished floor level.
- B. Where access is required for the purpose of manual operation, provide barriers for all live parts.
- C. Identify conductors with circuit numbers and phase color.
- D. Neatly arrange wiring within the equipment. Bundle and wrap conductors with plastic wire ties.

**END OF SECTION 26 09 23**

**SECTION 26 2200 - LOW-VOLTAGE TRANSFORMERS**

**PART 1 GENERAL**

**1.01 REFERENCE STANDARDS**

- A. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 2014
- B. NEMA ST 20 2014 - Dry-Type Transformers for General Applications; National Electrical Manufacturers Association

**1.02 REQUIREMENTS INCLUDED**

- A. The General Conditions, Supplementary General Conditions, Special Conditions and Division 1 General Requirements apply to the work of this section.
- B. This section describes requirements for dry type transformer.
- C. This section describes requirements for dry type transformer K-rated.

**1.03 RELATED WORK**

- A. Section 26 0100: General Requirements for Electrical Work.

**1.04 REFERENCE STANDARDS**

- A. The Underwriters Laboratory, Inc. (UL).
- B. National Electrical Manufacturers Association (NEMA).

**1.05 QUALIFICATIONS**

- A. The equipment manufacturer shall be ISO 9000, 9001 or 9002 certified.
- B. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- C. The transformers shall be suitable for and certified to meet all applicable seismic requirements of the International Building Code (IBC) for zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the transformer manufacturer and be based upon testing of representative equipment.
- D. The test response spectrum shall be based upon a 5 percent minimum damping factor, IBC: a peak of 0.75g, and a ZPA (zero period acceleration) of 0.38g. The tests shall fully envelope this response spectrum for all equipment natural frequencies up to at least 35Hz.

**1.06 SUBMITTALS**

- A. Submit manufacturers' data and shop drawings in accordance with Section 01 3000 - Administrative Requirements and Section 01 6000 - Product Requirements for items listed.
- B. Manufacturers Data:
  - 1. Dimension drawing and weight.
  - 2. Technical certification sheet.
  - 3. Conduit entry/exit locations.
  - 4. Transformer ratings including:
    - a. Primary and secondary kVA.

- b. Voltage.
- c. Taps.
- d. Primary and secondary continuous current.
- e. Basic Impulse level for equipment over 600-volts.
- f. Impedance.
- g. Insulation class and temperature rise.
- h. Sound level.

## **PART 2 PRODUCTS**

### **2.01 ALL TRANSFORMERS**

- A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
  - 1. Altitude: Less than 3,300 feet (1,000 m).
  - 2. Ambient Temperature: Not exceeding 86 degrees F (30 degrees C) average or 104 degrees F (40 degrees C) maximum measured during any 24 hour period.
- C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
- D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
- E. Basic Impulse Level: 10 kV.
- F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- G. Isolate core and coil from enclosure using vibration-absorbing mounts.
- H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

### **2.02 DRY TYPE POWER TRANSFORMERS**

- A. General: Provide dry type power transformers, for lighting and general power applications, rated as indicated.
- B. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, yearly operation, with normal life expectancy as defined in American National Standards Institute (ANSI) C57.96.
- C. Shipping: Provide lifting holes, accessible without removal of any of the enclosure components.
- D. Insulation, as listed:

Insulation Size	Temperature Class	Rating	Hot Spot Allowance
E. 2kVA & below	NEMA B or better	80 degress C rise	30 degrees C
F. 3kVA thru 15 kVA	NEMA F or better	115 degress C rise	30 degrees C
G. 15kVA and above	NEMA H	150 degress C rise	30 degrees C
H. Base temperature rating and hot spot allowances in the above table on a 40 degrees C maximum ambient temperature and 30 degrees C average ambient temperature.			
I. Overload Capacity: 10 percent above full load rating continuously in an ambient not exceeding 40 degrees C.			
J. Case Temperature: Maintain no more than a 35 degrees C rise above a 40 degrees C ambient.			
K. Taps, as listed:			

Transformer Rating	Phase	Taps
L. Through 10kVA	Single	None
M. 15kVA thru 2kVA	Single	(2) 5 percent FCBN
N. 6kVA thru 15 kVA	Three	(2) 5 percent FCBN
O. 30kVA and larger	Single and Three	(2) 2-1/2 percent FCAN and
P. (4) 2-1/2 percent FCBN		
where FCBN - Full Capacity Below Normal.		

Q. Sound levels, not to exceed listed values, as determined by NEMA standards:

Size	Sound Level in dB
Through 9kVA	40
10 through 50kVA	45
51 through 150kVA	50
151 through 300kVA	55
301 through 500kVA	60
501 through 700kVA	62
701 through 1000kVA	64

R. Provide vibration isolating mounts to isolate the enclosure from the core and coil assembly.

S. Mounting, suitable as listed:

1. Single Phase Transformers: Wall
2. Three Phase Transformers, through 15kVA: Wall.
3. Three Phase Transformers, 15kVA and above: Floor or ceiling hung channel.

T. Provide conduit knockouts for line and load conduit entrance.

U. Enclosure:

1. Units rated 30kVA and below, the encapsulated enclosure construction shall be totally enclosed, non-ventilated, NEMA 3R, with lifting eyes.
  2. Units rated 15kVA and above, the enclosure construction shall be ventilated, NEMA 2, drip-proof, with lifting holes. All ventilation openings shall be protected against falling dirt.
  3. Outdoor units rated 15kVA or above, provide suitable weather-shields over ventilation openings.
- V. Finish: Degrease, clean, phosphatize, prime and finish all interior and exterior surfaces with baked enamel, color ANSI 61 or standard factory grey.
- W. Connect a grounding strap from the secondary neutral to a grounding lug on the enclosure.
- X. Terminals: As specified in Section 16100 - Basic Materials and Methods.
- Y. Subject transformers 25kVA above to listed production test at factory:
1. Ratio tests at the rated voltage connection and at all tap connections.
  2. Polarity and phase relation tests on the rated voltage connection.
  3. Applied potential tests.
  4. Induced potential test.
  5. No-load and excitation current at rated voltage on the rated voltage connection.
- Z. Factory to perform the listed standard tests on unit of identical design:
1. No-load losses.
  2. Total losses.
  3. Sound levels.
  4. Temperature rise.
  5. Impulse.
  6. Impedance.
  7. Induced potential.
  8. Applied potential.
- AA. Submit certified test reports for production and standard tests.
- AB. Manufacture: Cutler-Hammer, General Electric, Sorgel.

### **2.03 DRY TYPE POWER TRANSFORMERS (K-FACTOR RATED)**

- A. General: Provide dry type power transformers, for lighting and general power applications, rated as indicated.
- B. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, yearly operation, with normal life expectancy as defined in American National Standards Institute (ANSI) C57.96.
- C. The transformers shall be specifically designed to supply circuits with a harmonic profile equal to or less than a K-factor of 4 to 13 without exceeding 115 degree C temperature rise.
- D. Shipping: Provide lifting holes, accessible without removal of any of the enclosure components.

E. Insulation, as listed:

Insulation Size	Temperature Class	Rating	Hot Spot Allowance
2kVA & below	NEMA B or better	80 degrees C rise	30 degrees C
3kVA thru 15kVA	NEMA F or better	115 degrees C rise	30 degrees C
15kVA & above	NEMA H	150 degrees C rise	30 degrees C

F. Base temperature rating and hot spot allowances in the above table on a 40 degrees C maximum ambient temperature and 30 degrees C average ambient temperature.

G. Case Temperature: Maintain no more than a 35 degrees C rise above a 40 degrees C ambient.

1. Taps, as listed:

Transformer Rating	Phase	Taps
Through 10kVA	Single	None
15kVA thru 25kVA	Single	(2) 5 percent FCBN
6kVA thru 15kVA	Three	(2) 5 percent FCBN
30kVA and larger	Single and Three	(2) 2-1/2 percent FCAN and (4) 2-1/2 percent FCBN

H. Sound levels, not to exceed listed values, as determined by NEMA standards:

Size	Sound Level in dB
Through 9kVA	40
10 through 50kVA	45
51 through 150kVA	50
151 through 300kVA	55
301 through 500kVA	60
501 through 700kVA	62
701 through 1000kVA	64

I. Non-linear ratings, to supply circuits with a harmonic profile equal or less than a K-factor of 13 as listed below without exceeding 115 degree C temperature rise:

Harmonic	K-13
Fund.	100%
3rd	70%
5th	42%
7th	5%
9th	3%
11th	3%
13th	1%
15th	.7%



17th

.6%

- J. Provide vibration isolating mounts to isolate the enclosure from the core and coil assembly.
- K. Mounting, suitable as listed:
  - 1. Three Phase Transformers, 15kVA and above: Floor or ceiling hung channel.
- L. Provide conduit knockouts for line and load conduit entrance.
- M. Finish: Degrease, clean, phosphatize, prime and finish all interior and exterior surfaces with baked enamel, color ANSI 61 or standard factory grey.
- N. Connect a grounding strap from the secondary neutral to a grounding lug on the enclosure.
- O. Terminals: As specified in Section 16100 - Basic Materials and Methods.
- P. Subject transformers 25kVA above to listed production test at factory:
- Q. Applied potential: 4kV.
  - 1. Induced potential: 2 times normal to 7200Hz.
  - 2. Ratio tests at the rated voltage connection and at all tap connections.
  - 3. Polarity and phase relation tests on the rated voltage connection.
  - 4. No-load and excitation current at rated voltage on the rated voltage connection.
- R. Perform the listed standard tests on unit of identical design:
  - 1. No-load losses.
  - 2. Total losses.
  - 3. Sound levels.
  - 4. Temperature rise.
- S. Impulse:
  - 1. Impedance.
  - 2. Induced potential.
  - 3. Applied potential.
- T. Submit certified test reports for production and standard tests.
- U. Manufacture: Cutler-Hammer, General Electric, Sorgel.

### **PART 3 EXECUTION**

#### **3.01 DRY TYPE POWER TRANSFORMER**

- A. Mount transformer on floor or wall as indicated.
- B. Provide one (1) vibration isolating mount, minimum 1 inch thick with 1 inch static deflection, for each mounting point on the transformer.
- C. Connect transformer with flexible metal conduit. Provide an insulated grounding bushing on conduit and bond to transformer case.

**END OF SECTION**

**SECTION 26 2413 - SWITCHBOARDS**

**PART 1 GENERAL**

**1.01 REQUIREMENTS INCLUDED**

- A. The General Conditions, Supplementary General Conditions, Special Conditions and Division 1 General Requirements apply to the work of this section.
- B. This section describes requirements for switchboards equipment.

**1.02 RELATED WORK**

- A. Section 26 0100: General Requirements for Electrical Work.

**1.03 REFERENCE STANDARDS**

- A. The Underwriters Laboratory, Inc. (UL).
- B. National Electrical Manufacturers Association (NEMA).

**1.04 SUBMITTALS**

- A. Submit manufacturers' data and shop drawings in accordance with Section 01 3000 - Administrative Requirements and Section 01 6000 - Product Requirements for items listed.
- B. Manufacturers Data:
  - 1. Switchboard.
- C. Shop Drawings:
  - 1. Switchboard.

**PART 2 PRODUCTS**

**2.01 SWITCHBOARD**

- A. Construction:
  - 1. Enclosure: Rigid, dead-front, metal enclosed, free standing, bussed structures, bolted together. Provide removable, 12 gauge sheet steel, minimum, screw-on access plates at front, top and rear.
  - 2. Quality control: Provide each vertical section which is composed of UL listed devices with a UL Label. Provide switchboard which conforms to applicable NEMA standards. Test switchboard at factory before delivery.
- B. Bussing:
  - 1. Phase Bus: Silver-plated copper, rated 1,000 amperes per square inch cross sectional area maximum, braced for 50,000 RMS amperes minimum.
  - 2. Neutral Bus: Full-size, copper, with lugs for connection of neutral conductors, in accordance with Section 26 01 00 – General Requirement of Electrical Work.
  - 3. Ground Bus: Half-size, copper, with lugs for connection of ground conductors, in accordance with 26 01 00 – General Requirement of Electrical Work.
  - 4. Spacing: Maintain code separation between phases and between phase and ground.
- C. Shipping:
  - 1. Provide lifting eyes for handling switchboard.
  - 2. Provide shipping splits, if required and main bus-splice plates for reconnection at job site.

- D. Finish: Degrease, clean, phosphatize, prime, and finish all interior, and exterior surfaces with baked enamel, color American National Standards Institute (ANSI) 61, or standard factory grey.
- E. Nameplates: Provide nameplates for all circuit breakers and manufacturers' nameplate indicating voltage and current rating, switchboard type and shop order number.
- F. Padlocking Devices: Provide for all breakers and switches.
- G. Circuit Breakers: Provide circuit breakers in frame sizes 100 through 800 amperes with thermal-magnetic trip units. Provide circuit breakers in frame sizes 1200 through 2000 amperes with electronic trip units that are insensitive to changes in ambient temperature within the circuit breaker's normal operating temperature range. Provide facility in 400 through 800 ampere frame circuit breakers for either thermal-magnetic or electronic interchangeable trip units. Provide circuit breakers with toggle-type handles which are trip-free and trip-indicating. All poles of multi-pole device shall operate simultaneously during open, close and trip operations. Provide circuit breakers indicated with the following ratings:

Circuit Breaker Frame Size	Trip Rating Amperes	Voltage Rating)	(AC Symmetrical AC Interrupting Capacity
100/2	15 - 100	240	10,000 Min
100/3	15 - 100	240	10,000 Min
225/3	70 - 225	240	65,000 Min
250/3	70 - 250	240	65,000 Min
400/3	250 - 400	240	65,000 Min
600/3	300 - 600	240	65,000 Min
800/3	500 - 800	240	65,000 Min
1200/3	800 - 1200	240	65,000 Min
1600/3	1200 - 1600	240	65,000 Min
2000/3	1800 - 2000	240	65,000 Min

- H. Manufacturer: Cutler-Hammer "POW-R-LINE C", Square D "Power Style", General Electric "AV-Line".

**PART 3 EXECUTION**

**3.01 SWITCHBOARDS**

- A. Protect switchboards from damage, abuse, dirt and debris during construction. Keep equipment free from dirt, scratches, nicks, blisters and other marks not part of the factory finish. Make touch-ups to the finish with factory enamel.
- B. Unless noted on drawing, anchor free standing panels to concrete slabs with 1/2 inch or larger anchor bolts fastened to malleable iron or steel expansion shields in the slab. Submit a detail indicating anchor method.
- C. Coordinate all required conduit openings, blockouts, stub-ups, and conduit entrance requirements.
- D. Identify conductors with circuit numbers and phase tape.
- E. Neatly arrange wiring within the equipment. Bundle and wrap conductors #8 AWG and smaller with plastic wire ties.
- F. Install an insulated grounding bushing on conduits which enter the equipment.

**END OF SECTION**

**SECTION 26 2416 - PANELBOARDS**

**PART 1 GENERAL**

**1.01 REFERENCE STANDARDS**

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
- B. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- C. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- D. UL 67 - Panelboards; Current Edition, Including All Revisions.

**1.02 SUMMARY**

- A. This section describes requirements for branch circuit panelboards.

**1.03 RELATED WORK**

- A. Section 26 0100: General Requirements for Electrical Work.

**1.04 REFERENCE STANDARDS**

- A. The Underwriters Laboratory, Inc. (UL).
- B. National Electrical Manufacturers Association (NEMA).

**1.05 SUBMITTALS**

- A. Submit manufacturers' data and shop drawings in accordance with Section 01 3000 - Administrative Requirements and Section 01 6000 - Product Requirements for items listed.
- B. Manufacturers Data:
  - 1. Panelboards.
- C. Shop Drawings.
  - 1. Panelboards.

**PART 2 PRODUCTS**

**2.01 ALL PANELBOARDS**

- A. Provide products listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose indicated.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet (2,000 m).
  - 2. Ambient Temperature:
- C. Short Circuit Current Rating:
  - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
  - 1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
  - 2. Boxes: Galvanized steel unless otherwise indicated.
    - a. Provide wiring gutters sized to accommodate the conductors to be installed.
  - 3. Fronts:
  - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

## 2.02 BRANCH CIRCUIT PANELBOARDS

- A. General: Provide bussed, circuit breaker or fusible switch type panelboards with main lugs or circuit breaker in flush or surface mounted enclosures as indicated.
- B. Construction:
  - 1. Cabinets: Code gauge steel cabinets, deadfront panels, and doors. Fasten deadfront panels to cabinets with concealed trim fasteners. Conceal front door hinges.
  - 2. Dimensions: 20 inches wide by 6 inches deep.
  - 3. Locks: Flush door locks, keyed alike for all panelboards.
  - 4. Access: Door-in-Door (Not EZ-Trim).
  - 5. Standards: Provide UL label where applicable and conform to No. 67 and 50 Underwriters Laboratories, Inc., and NEMA PB-1.
- C. Bussing:
  - 1. Phase Bus: Silver-plated copper, rated 1000 amperes per square inch cross sectional area maximum, braced for 100,000 rms amperes minimum.
  - 2. Neutral Bus: Copper with lugs for connection of neutral conductors.
  - 3. Ground Bus: Copper with terminals for equipment grounding conductors.
  - 4. Terminals: As specified in Section 26 0519 - Building Wire and Cable.
- D. Finish: Degrease, clean, phosphatize, prime, and finish cabinets, deadfront panels, and doors with baked enamel, color ASA-61, or standard factory grey. Galvanized cabinets are acceptable for flush cabinets.
- E. Nameplates:
  - 1. Provide a nameplate identifying panelboard in accordance with 26 0100 - General Requirements for Electrical Work.
  - 2. Provide a manufacturer's nameplate on the deadfront interior panel indicating panelboard type, voltage rating, current rating and manufacturer's name.

- F. Directory: Provide a directory card which fits into slots in the back of the panelboard. Protect directory with non-yellowing clear plastic.
- G. Manufacturer: Westinghouse (Pow-R-Line 2), General Electric, Square D.
- H. Circuit Breakers:
  - 1. Provide circuit breakers for miscellaneous branch circuits with frame sizes and ratings as shown on the plans.
  - 2. Bolt-on, thermal magnetic, molded case, with inverse time current overload, and instantaneous magnetic trips, trip-free and trip-indicating all poles of multi-pole device shall operate simultaneously during open, close and trip operations. Provide circuit breakers indicated with the following ratings:

Panel Type	Circuit Breaker Frame Size	Trip Rating (Amperes)	Voltage (Ac Rating)	Symmetrical AC Interrupting Capacity
1	100/1 pole	15-100	120	10,000 Min
	100/2 & 3 poles	15 – 100	240	10,000 Min
	150/2 & 3 poles	110 - 150	240	18,000 Min
	225/3 poles	125 - 225	240	22,000 Min

	Circuit Breaker Frame Size	Trip Rating (Amperes)	Voltage (Ac Rating)	Symmetrical AC Interrupting Capacity
2	100/1 pole	15-100	277	14,000 Min
	100/2 & 3 poles	15 – 100	480	14,000 Min
	150/2 & 3 poles	110 - 150	480	25,000 Min
	225/3 poles	125 - 225	480	25,000 Min

- I. Manufacturer: Eaton Cutler-Hammer (Pow-R-Line 2), General Electric, Square D.

**PART 3 EXECUTION**

**3.01 BRANCH CIRCUIT PANELBOARDS**

- A. Mount panelboard so that the top is 6 feet-6 inches above the finished floor.
- B. Neatly terminate conductors onto breaker, ground bus and neutral bus. Train conductors in an organized grouping with conductors fanning out at the circuit terminals, bundled in the wireways and laced with plastic ties.
- C. Identify all conductors with a circuit number and phase color.
- D. Type all panelboard directories.
- E. Provide a minimum of three (3) 3/4 inch empty conduits into accessible ceiling space.
- F. Provide insulated grounding bushings on all conduits which enter the cabinet and bond to ground bus.
- G. Install conduits in a vertical line, perpendicular to the cabinet.

**END OF SECTION**

**SECTION 26 27 26 - WIRING DEVICES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide electrical materials, installation and testing for the site improvements and new building.

**1.02 DESCRIPTION**

- A. This section describes requirements for wiring devices and connections.

**1.03 RELATED WORK**

- A. Section 26 01 00: General Requirements for Electrical Work.
- B. Section 26 05 26: Grounding.

**1.04 REFERENCE STANDARDS**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2000.
- B. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).
- C. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; 2002.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; 2005.

**1.05 SUBMITTALS**

- A. Submit manufacturers' data and shop drawings in accordance with Section 01 30 00 - Administrative Requirements and Section 01 60 00 - Product Requirements for items listed.
- B. Provide submittals for items listed documenting compliance with specification requirements.
- C. Product Data:
  - 1. Electrical Materials: Manufacturer's current published catalog sheets.

**PART 2 - PRODUCTS**

**2.01 ALL WIRING DEVICES**

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**2.02 WIRING DEVICES**

- A. Provide UL listed wiring devices, ivory or color selected by Engineer, with voltage and current ratings specified and wire terminations designed to contain stranded conductors. Provide grounding type receptacles. Provide RED color for all wiring devices connected to the emergency power system.
- B. Provide 120 volt single and duplex receptacles which meet Federal Specification W-C-596 as listed:
  - 1. SPECIFICATION GRADE – COMMERCIAL:

TYPE	HUBBELL	PASS & SEYMOUR	LEVITON
NEMA 5-20R single	#5361	#5361	#5361
NEMA 5-20R duplex	#5362	#5362	#5362



NEMA 5-20R duplex with isolated ground	#IG-5362	#IG-6300	#5362-IG
NEMA 5-20R duplex with GFCI	#GF-5362	#2091-S	#6599

- C. Provide receptacles other than 120 volt single and duplex as indicated on drawings.
- D. Provide 20 amp AC quiet type switches which meet federal specification W-C596 with voltage ratings to suit branch circuit requirements indicated and as listed:

TYPE	HUBBELL	PASS & SEYMOUR	LEVITON
Single Pole	1221	20AC	1221
Double Pole	1222	5952	1222
Three Way	1223	20AC3	1223
Four Way	1221	5954	1224
SPST Momentary	1557	5935	1257

- E. Listed manufacturers establish a standard of quality. Substitutions will be considered in accordance with Section 26 01 00, General Requirements for Electrical Work.
- F. Key Switches: Equivalent to listed switches, activated with removable key.
- G. Switch with Pilot Light: Leviton #5226, Bryant #6405, G.E. #7945, or equal.
- H. Wall Plates: Type 302 stainless steel, satin finish, minimum 0.040 inch thick, single or multiple gang.

**PART 3 - EXECUTION**

**3.01 WIRING DEVICES**

- A. Connect wiring devices to circuits indicated using side or back wiring terminals, designed to contain stranded wire.
- B. Connect green grounding pigtail from receptacles to outlet box with screw.
- C. Install wiring devices flush with the device plate fronts.
- D. Align plates plumb with wall, and cover opening, without use of "jumbo" plates.

**END OF SECTION 26 27 26**

**SECTION 26 28 16.16 - ENCLOSED SWITCHES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide electrical materials, installation and testing for the site improvements and new building.

**1.02 DESCRIPTION**

- A. This section describes requirements for fused and non-fused disconnects.

**1.03 RELATED WORK**

- A. Section 26 01 00: General Requirements for Electrical Work.

**1.04 REFERENCE STANDARDS**

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002.
- B. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2001.
- C. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

**1.05 SUBMITTALS**

- A. Submit manufacturers' data and shop drawings in accordance with Division 1 – General Conditions.
- B. Provide submittals for items listed documenting compliance with specification requirements.
- C. Product Data:
  - 1. Electrical Materials: Manufacturer's current published catalog sheets.

**PART 2 - PRODUCTS**

**2.01 DISCONNECTS, FUSED AND NON-FUSED**

- A. Where indicated, provide horsepower rated disconnect switches, pad-lockable in the open position.
- B. Three Phase Switches (over 10 horsepower):
  - 1. Fused or non-fused, as indicated, 600 VAC, heavy duty type safety switches, mounted in NEMA 1 general purpose enclosures in dry locations and NEMA 3R rain-tight enclosures in damp or wet locations, Westinghouse "H600", General Electric "Type TH", Square D "Heavy Duty" or equal.
  - 2. Clearly indicate on the switch enclosure the "on" and "off" positions.
  - 3. Mechanisms, quick-make, quick-break.
  - 4. Door interlock, defeatable to facilitate access into the switch enclosure with the switch in the closed position. Equip fusible switches with Class R fuse rejection clips.
- C. Single Phase Switches (non-fused):
  - 1. 120/240 VAC, general duty type safety switches, mounted in NEMA 1 general purpose enclosures in dry locations and NEMA 3R rain-tight enclosures in damp or wet locations, Cutler Hammer "DG", General Electric "Spec-Setter TG", Square D "Class 3130" or equal.
  - 2. Clearly indicate on the switch enclosure the "on" and "off" positions.

3. Mechanisms, quick make, quick break
4. Door interlock, defeatable to facilitate access into the switch enclosure with the switch in the closed position.

**PART 3 - EXECUTION**

**3.01 DISCONNECT SWITCHES**

- A. Install disconnect switches where indicated. Provide all mounting hardware and accessories.
- B. Provide a flexible connection from the disconnect switch to the motor unless otherwise indicated.
- C. Attach disconnect switches with specified anchors.
- D. Apply phase tape and identify circuit numbers as specified.
- E. Install fuses where indicated or when required by UL listing of equipment.

**END OF SECTION 26 28 16.16**

**SECTION 26 51 00 - INTERIOR LIGHTING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This section describes requirements for lighting fixtures, lamps, ballasts and accessories.
- B. This section describes requirements for conduit for the site improvements and new building.

**1.02 DESCRIPTION**

- A. Provide all equipment and materials for a complete lighting system as described herein and as shown on the plans.

**1.03 RELATED REQUIREMENTS**

- A. Section 26 01 00: General Requirements for Electrical Work.
- B. Section 26 09 23: Lighting Control Devices

**1.04 SUBMITTALS**

- A. Procedure: Submit under provisions of Division 1 – General Conditions.
- B. Provide submittals for items listed documenting compliance with specification requirements.
- C. Product Data:
  - 1. Lighting Fixtures: Manufacturer's current published catalog sheets, including photometric information, size, weight, finishes and accessories.
- D. Warranties: Manufacturer's certified warranty documentation.
- E. Shop Drawings:
  - 1. Lighting Fixtures.

**PART 2 - PRODUCTS**

**2.01 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products that comply with the requirements of NFPA 70 and NFPA 101.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, drivers, reflectors, lenses, housings, and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

**2.02 FIXTURE TYPES – NOT USED**

**2.03 LIGHTING FIXTURES**

- A. General: Provide fixtures as indicated, factory wired, ready for field connection.
- B. Provide recessed fixtures with complete mounting hardware and trims to suit the type of ceiling in which they are installed. Provide access to lamps and drivers in recessed fixtures through the lensed door or fixture opening, without requiring removal of fixture.

- C. Equip recessed LED fixtures with a factory wired junction box and flexible conduit to fixture housing, when available.
- D. Equip pendant mounted fixtures with stems, ball aligners, canopies, swivel hangers, safety cable and all mounting hardware required to conform to State of California seismic safety standards.
- E. For surface mounted fixtures provide all blocking, mounting channels required and hardware for mounting.
- F. Provide fixtures Underwriters Laboratories, Inc. (UL) approved for installation against low density ceilings where applicable. Do not use spacers.
- G. All Luminaires
  - 1. Comply with IES LM-79-08 Approved Method for measuring lumen maintenance of LED light sources.
  - 2. Comply with IES LM-80-08 Approved Method for electrical and photometric measurement of SSL product.
  - 3. Comply with In-Situ testing for more reliable results.
  - 4. LED's shall be Restriction of Hazardous Substances Directive (RoHS) compliant.
  - 5. LED arrays shall be sealed, high-performance, long-life type, minimum 50,000 hours.
  - 6. Drivers shall be solid state and accept 120 through 277 VAC at 60 Hz input.
  - 7. The LED light source shall be fully dimmable with use of compatible dimmers switch designated for low voltage loads.
  - 8. LED color temperatures: as noted.
  - 9. Luminaires shall have internal thermal protection.
  - 10. Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.
  - 11. Color spatial uniformity shall be within .004 of CIE 1976 diagram.
  - 12. Color maintenance over rated life shall be within .007 of CIE 1976.
  - 13. Indoor luminaires shall have a minimum CRI of 90.
  - 14. Luminaire manufacturers shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management.
  - 15. Luminaires shall be fully accessible from below ceiling plane for changing drivers, power supplies and arrays.

### **PART 3 - EXECUTION**

#### **3.01 LIGHTING FIXTURES**

- A. Install lighting fixtures complete with lamps, ready for operation.
- B. Set level, plumb, and square with ceilings and walls, and secure according to manufacturers written instructions and approved submittal materials, unless otherwise indicated.
- C. Secure fixtures to the structure by means of brackets, flanges another mounting hardware suited for the fixtures and type of installation.

- D. Connect recessed fixtures with flexible metal conduit and fixture tap wire as specified in Section 26 0534 - Conduit and 26 0519 - Building Wire and Cable.
- E. Secure surface mounted fixtures with a minimum of (2) 1/4-inch bolts, or as detailed.
- F. Remote Mounting of Drivers: Distance between the driver and fixture shall not exceed that recommended by manufacturer. Verify, with manufacturers, maximum distance between driver and luminaire.
- G. Mounting height indicated from finished floor to bottom of pendant luminaire or to the center of the outlet box for wall mounted luminaires unless otherwise noted. Verify mounting heights with Architect and Lighting Designer.
- H. Mounting height may also be indicated as the length of the pendant below finished ceiling.
- I. Provide all necessary hanging or mounting devices and accessories for all luminaires. Verify the types needed for various ceiling conditions. Plaster rings shall be provided where required.
- J. Verify weight and mounting method of all luminaires prior to ordering and provide suitable support. Coordinate with General Contractor for luminaires that require additional blocking or support. Luminaire mounting assemblies shall comply with all local seismic codes and regulations.
- K. Refer to architectural reflected ceiling plans for coordination of luminaire locations with mechanical, fire protection, technology, and fire safety equipment. Where conflicts occur, coordinate with Architect and Engineer prior to installing any of the Systems.

**3.02 SIESMIC LIGHTING BRACING**

- A. Firmly attach items weighing less than 20 pounds to main cross runners. Two 12 gauge support wires to the ceiling system hangers or structure shall be included for items from 20 to 56 pounds. Directly support items over 56 pounds from the structure above with approved hangers

**3.03 CLEANING**

- A. Clean lighting fixtures prior to final acceptance.

END OF SECTION

**SECTION 26 56 00 - EXTERIOR LIGHTING**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior luminaires.
- B. LED Drivers
- C. LED Lamps.
- D. Poles and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 01 00: General Requirements for Electrical Work.
- B. Section 03 30 00 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- C. Section 26 05 33.16 - Boxes for Electrical Systems.

**1.03 REFERENCE STANDARDS**

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.
- C. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type); 2002.
- D. ANSI O5.1 - American National Standard for Wood Poles -- Specifications and Dimensions; 2015.
- E. IES RP-8 - Roadway Lighting; 2014.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- G. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 1598 - Luminaires; Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Division 1 for submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
- D. Test Reports: Indicate measured illumination levels.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- F. Operation and Maintenance Data: Instructions for each product including information on replacement parts.



**1.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with a minimum of three years documented experience.
- C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.
- C. Store in a dry location until installed and handle with care not to damage finish. maintain in manufacturer's package material until installation.

**1.07 COORDINATION**

- A. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

**1.08 EXTRA MATERIALS**

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Furnish two of each type and wattage lamp installed.

**PART 2 - PRODUCTS**

**2.01 LUMINAIRES AND POLES**

- A. Furnish products as indicated in luminaire Schedule .

**2.02 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings, and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. All Luminaires
  - 1. Comply with IES LM-79-08 Approved Method for measuring lumen maintenance of LED light sources.
  - 2. Comply with IES LM-80-08 Approved Method for electrical and photometric measurement of SSL product.
  - 3. Comply with In-Situ testing for more reliable results.
  - 4. LED's shall be Restriction of Hazardous Substances Directive (RoHS) compliant.
  - 5. LED arrays shall be sealed, high-performance, long-life type, minimum 50,000 hours.

6. Drivers shall be solid state and accept 120 through 277 VAC at 60 Hz input.
7. The LED light source shall be fully dimmable with use of compatible dimmers switch designated for low voltage loads.
8. LED color temperatures: as noted.
9. Luminaires shall have internal thermal protection.
10. Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.
11. Color spatial uniformity shall be within .004 of CIE 1976 diagram.
12. Color maintenance over rated life shall be within .007 of CIE 1976.
13. Indoor luminaires shall have a minimum CRI of 85.
14. Luminaire manufacturers shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management.
15. Luminaires shall be fully accessible from below ceiling plane for changing drivers, power supplies and arrays.

### **2.03 LED ARRAYS**

- A. All LED's of the same type are to be provided by the same manufacturer.
- B. Equip each luminaire with the proper LED array of the type shown or specified in the Luminaire Schedule.
- C. Provide LED lamps as indicated on the fixture schedule.

### **2.04 POLES**

- A. Manufacturers: as indicated in the luminaire schedule
- B. All Poles:
  1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products in accordance with manufacturer's instructions.
- D. Install luminaires in accordance with NECA/IESNA 501.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Provide concrete bases for lighting poles at locations indicated, in accordance with Section 03 3000.
- I. Install poles plumb.
  1. Provide double nuts to adjust plumb.

- 2. Grout around each base provide sack finish on exposed concrete bases above ground.
- J. Install lamps in each luminaire.
- K. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor. Provide supplementary grounding electrode at each pole.

**3.02 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- D. Operate each luminaire after installation and connection to verify proper operation.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

**3.03 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Aim and adjust luminaires to provide illumination levels and distribution indicated on Drawings.

**3.04 CLEANING**

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

**3.05 CLOSEOUT ACTIVITIES**

**3.06 LUMINAIRE SCHEDULE - SEE DRAWINGS**

**END OF SECTION 26 56 00**

**SECTION 28 46 00 - FIRE DETECTION AND ALARM**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This section describes requirements for manual and automatic fire alarm systems.
- B. The system as specified shall be supplied, install, tested, and approved by the local Authority Having Jurisdiction, and turned over to the owner in an operation condition.

**1.02 DESCRIPTION**

- A. Work includes:
  - 1. Furnish all labor, fire protection engineering, design, materials, tools, equipment and services for fire detection and alarm system consisting of addressable initiating and signaling devices, conduit, boxes, wiring, annunciator panels, and other components necessary for proper operation, testing and control of a complete and demonstrable operable system.
  - 2. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, and complete installation. Any omission in specified equipment will not relieve the Contractor of the responsibility for furnishing and installing a fully operational system.
  - 3. Provide all electrical connections needed for new equipment. The term "electrical connections" includes all operations and materials associated with completing electrical connection starting with pulled in wire including, but is not limited to:
    - a. Stripping of jacket(s) and insulation.
    - b. Checking for continuity.
    - c. Meggering.
    - d. Tracing of wire.
    - e. Fanning.
    - f. Measuring and cutting to final termination lengths.
    - g. Installing wire and permanent wire markers for identification of conductors.
    - h. Installation of lugs, connectors or terminals.
    - i. Fastening wire to designated terminal point or other designated point.
    - j. Taping.
- B. Description of system: Automatic and manual, addressable, analog, general alarm, supervised, 24 volt DC fire detection and alarm system.
  - 1. Provide non-coded positive non-interfering system.
- C. Provide components including but not limited to the following.
  - 1. Fire alarm control panel.
  - 2. Remote annunciator.
  - 3. General alarm addressable manual stations.
  - 4. Automatic addressable heat detectors with provisions for future analog output devices.
  - 5. Automatic addressable smoke detectors with provisions for future analog output devices.
  - 6. Automatic addressable duct detectors with provisions for future analog output devices.

7. Remote alarm indicator with test/reset switch for concealed smoke detectors/duct detectors.
8. Sprinkler and standpipe flow switch and main water-flow detector circuits.
9. Main, post indicator valve and O, S & Y sprinkler valve tamper switch circuits.
10. Separate power supply with battery backup and circuiting to fire alarm activated door closers (24V).
11. Modules for interfacing contact closure devices to addressable system. Do not use interface modules to connect non-addressable manual stations to fire alarm system.
12. Flashing general alarm lights.
13. Combination audible and visual signal devices.
14. Fire alarm system conduit and wire.

**1.03 FIRE ALARM SYSTEM: SCOPE**

A. General:

1. This project includes the complete and fully functional fire alarm system as specified on plan for the building.

B. Scope of Work:

1. Prepare complete shop drawings and obtain Engineer's approval prior to Contractor's deferred approval submission.
2. Furnish, install, connect and test new manual pull stations: horn, strobes, smoke detectors, heat detectors, duct detectors, Division 23 Fire/Smoke Dampers, door holders, flow and tamper switches and wiring (in conduit) to the fire alarm control panel.
3. Provide and install new fire alarm signal transmitter to transmit signal to local fire dispatch.
4. Test and demonstrate operation of the fire alarm control panel with initiating and signal appliance devices installed and connected.
5. Post permanent signage on door(s) leading to the fire alarm control panel stating the following: FIRE ALARM PANEL. Letters shall be no less than 3 inches tall, white in color on red background. In addition, provide similar signage on all doors leading to remote power supplies or other fire alarm control equipment.

C. Fire Protection/Automatic Sprinkler System: Division 21 Main sprinkler water-flow detector and sprinkler flow alarm switches.

D. Fire Protection/Automatic Sprinkler System: Division 21 Main sprinkler water valve, post indicator valve and O, S and Y valve tamper switches.

**1.04 RELATED SECTIONS**

- A. Section 26 01 00: General Requirements for Electrical Work.
- B. Section 26 08 01: Electrical Acceptance Testing.

**1.05 QUALITY ASSURANCE**

A. System standards:

1. National Fire Protection Association (NFPA) 72, 2022 Edition
2. National Fire Protection Association 90A.
3. California Electrical Code (CEC) 2022 edition, Article 760.
4. California Building Code (CBC), 2022 edition Title 24 Parts 2,3,7,9, & 12.

5. Factory Mutual (FM) approved.
  6. Approved by California State Fire Marshal (CSFM) and Title 19.
  7. TITLE 24 Parts 2, 3, 7, 9, & 12.
  8. National Electrical Manufacturer's Association (NEMA) 72 Protective Signaling Systems.
  9. NEMA SB-27 Signaling Apparatus.
  10. NEMA SB-9 Smoke Detectors
  11. NEMA ICS 1 Industrial Controls and Systems.
  12. NEMA ICS 4 terminal Blocks for Industrial Control Equipment and Systems.
  13. NEMA ICS 6 enclosure for Industrial Control and Systems.
  14. Other codes as required.
- B. Design criteria:
1. Comply with all system standards.
  2. Meet all requirements of fire authorities having jurisdiction.
  3. Complete fire detection and alarm system design, wiring diagrams, interface wiring diagrams, and operational details by system manufacturer or authorized technical representative.
  4. System: All equipment shall be approved and listed by the CSFM and Underwriters Laboratories, Inc. (UL).
  5. Installation shall conform to the CSFM requirements and shall be subject to inspection by them.
- C. Contractor qualifications:
1. Offer an annual maintenance contract including complete service and equipment costs for maintenance of complete system.
  2. Show evidence upon request of five years experience minimum servicing fire alarm systems.
  3. Show evidence upon request of five years experience minimum installing systems of similar type and scope.
  4. Provide for 24-hour emergency service.
  5. Factory trained technicians.

**1.06 GUARANTEE**

- A. Warrant the entire fire alarm system improvements for a period of 2 years.
- B. For all repairs that cannot be completed after the initial response, submit a written plan of correction to the Owner prior to leaving the premises.
- C. Furnish warranty service from the installing company. Provide response time for emergency service no longer than 2 hours from the time of notification. For non-emergency service provide response time no longer than twenty-four (24) hours from the time of notification

**1.07 SUBMITTALS**

- A. Submit the following with shop drawings:
  1. Floor plans showing the entire area, all fire rated walls, the addresses for all addressable devices and the routing of conduit and wire. Indicate on all conduit runs, the conduit size and type and size of wires.

2. Single line riser diagram showing all fire alarm system circuits.
  3. Point to point diagram.
  4. Wiring diagrams that indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
  5. Technical data showing exact types and quantity of all fire alarm system components. High-light or otherwise identify specific components on catalog cut sheets. All equipment drawing alarm or supervisory current shall have documentation of the current draw highlighted in the submittal information.
  6. CSFM listing sheet with current expiration date for each component.
  7. Battery capacity calculations. Submit complete battery calculation sheet showing all the electrical requirements for the entire fire alarm system, including the power consumption to the individual devices, both in alarm and supervisory modes on 8-1/2 x 11 inch paper.
  8. Voltage drop calculations for all wire and cable runs.
  9. Equipment list to show all fire alarm system components, the symbols used, the quantities, manufacturers' model number and CSFM listing numbers.
  10. Provide sequence of operations to show how the system will react to the activation of each type of device.
  11. List of wire and cable that specifies gauge and type of wire to be used.
  12. Details and listing number of through penetration fire stop system.
  13. All fire alarm panel programming information.
  14. Details for mounting of equipment.
  15. Stamp and signature of design professional of record.
  16. Include the following statements on shop drawings:
    - a. Provide fire alarm system that conforms to Article 760 of the CEC.
    - b. Do not start installation of the fire alarm system until details, plans and specifications, CSFM Listing Sheets, including listing number with annual update and expiration date, for all system components have been approved by the CSFM.
    - c. Keep a stamped set of approved fire alarm shop drawings on the job site and use for installation. Obtain approval for all deviations from approved shop drawings, including substitution of devices, from the CSFM.
    - d. Upon completion of the installation of the fire alarm system, perform two separate tests. In both tests, successfully demonstrate all functions required in the contract. Complete one test in the presence of the Owner's representative and conduct a separate test for final acceptance by the CSFM in the presence of the Owner's representative.
    - e. Bring all discrepancies between the drawings and the codes or recognized standards to the attention of the Owner.
    - f. Provide a minimum of 48 hours notice to the Owner's representative for all inspection and/or testing.
- B. Submittals will be automatically rejected if complete listing information does not accompany submittal.

#### **1.08 OPERATION AND MAINTENANCE MANUAL**

- A. Provide a minimum of 6 copies of the Operations and Maintenance Manual. Label and neatly install the manuals in a binder with tabs and sections as indicated in a Table of

Contents. Neatly fold large drawings and blueprints. Include manufacturers' data sheets, maintenance and operation information sheets, copies of all programming sheets with the final room numbers included, as built drawings showing the final room numbers, and any other information on operation or maintenance.

- B. Submit 2 copies of complete as-built installation wiring documentation, internal fire alarm control panel schematics, and maintenance manuals prior to final acceptance.

#### **1.09 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Provide material that is new, in condition acceptable to Owner's representative and suitable for intended use.
- B. Deliver materials in the original, unopened and labeled packages.
- C. Handle and store materials to protect from damage.
- D. Deliver spare parts to the Owner's representative. Obtain a receipt as proof of delivery of spare parts specified in this Section.

#### **1.10 SITE EXAMINATION AND CONDITIONS**

- A. Refer to Section 26 01 00 - General Requirements for Electrical Work, Article 1.14: Coordination with other trades.
- B. Accept information shown on the drawings based upon available records and data as approximate only. Make minor deviations found necessary to conform to actual locations and conditions with no increase in contract sum.

### **PART 2 - PRODUCTS**

#### **2.01 FIRE ALARM SYSTEM**

- A. Acceptable manufacturer:
  - 1. Manufacturer must have local service organization.
  - 2. Silent Knight or equal. The system shall be nonproprietary.
- B. All equipment:
  - 1. UL listed as a product of a single manufacturer under appropriate category.
  - 2. Equipment shall not be modified or installed to alter or void UL label or listing.
  - 3. CSFM listed.
  - 4. Equipment and material damaged during transportation, installation, or operation will be considered as totally damaged. Replace with new. Variance from this will be permitted only with written approval from the Owner's Representative.
  - 5. Miscellaneous Accessories: Channels, joiners, hangers, caps, nuts and bolts, and associated parts shall be plated electrolytically with zinc, followed immediately thereafter by treating the freshly deposited zinc surfaces with chromic acid to obtain a surface which will not form a white deposit on surface for an average of 120 hours when subject to a standard salt spray cabinet test or accessories shall be hot-dipped galvanized.



**2.02 FIRE ALARM SYSTEM OPERATION: SUPERVISORY**

- A. Supervisory signals shall cause the following:
  - 1. Fire alarm control panel to enter supervisory mode.
  - 2. Transmit a supervisory signal to the remote alarm station.

**2.03 FIRE ALARM SYSTEM OPERATION: TROUBLE**

- A. Initiation of any trouble signal condition shall cause the following:
  - 1. Fire alarm control panel to enter trouble mode.
  - 2. Transmit the trouble signal to the remote alarm station.
  - 3. Annunciate trouble at fire alarm control and remote annunciator.
- B. Reset the control unit at fire alarm control panel.
- C. Remote station signaling unit shall automatically transmit fire alarm and/or trouble signals via telephone line to following location(s):
  - 1. Fire Dispatch alarm receiver.
- D. Activation of any system trouble shall initiate the following:
  - 1. Common audible trouble signal shall sound and trouble light shall illuminate at remote annunciators.
  - 2. Common audible trouble signal shall sound and illuminate at CPU. Also a specific display shall be provided at CPU to indicate specific device.
- E. Audible trouble signal shall be silence-able by switch. Visual trouble indication remains until trouble condition is corrected. A subsequent trouble condition received after manually silencing shall cause audible trouble signal to resound. Restoration of system to normal causes audible trouble signal until silencing switch is returned to normal position. Trouble signal will be initiated under following conditions:
  - 1. Open on an initiation or alarm indicating circuit.
  - 2. Open in wiring to remote zone light annunciator(s).
  - 3. Ground fault condition.
  - 4. Auxiliary manual control switch out of normal position.
  - 5. Loss of 120 volt operating power to CPU.
  - 6. Low or no battery voltage condition.
  - 7. Main sprinkler valve is closed.
  - 8. Post indicator valve is closed.
  - 9. Any sprinkler or standpipe O, S & Y valve is closed.

**2.04 FIRE ALARM SYSTEM OPERATION: ALARM**

- A. Activation of any signal initiating devices shall cause the following:
  - 1. Fire alarm control panel to enter alarm mode.
  - 2. Transmit the alarm signal to remote alarm station.
  - 3. Operate alarm horn/strobes.
  - 4. Annunciate the alarm at the remote annunciation.
  - 5. Shut down fans in the affected and adjoining zones as described in the specifications/plans for this project.

- B. Area smoke detector alarm shall also cause the following:
  - 1. Fire alarm control panel to enter supervisory mode.
  - 2. Transmit a supervisory signal to the remote alarm station.
  - 3. Release fire/smoke damper control for duct in which duct detector is in alarm.
- C. Configure horn/strobes and strobes to operate in a synchronized fashion and to be silenced at fire alarm control panel. Provide capability to silence horns of horn/strobe combinations allowing strobe to continue in alarm mode.
- D. All fire alarm signals are automatically locked in at CPU and remote annunciators until originating device is returned to normal and CPU is manually reset.
  - 1. Audible alarm signals shall be silence-able from CPU and LCD panel allowing for re-initiation following a subsequent alarm. Silencing of alarm signals shall not impair ability of system to continue to perform as specified.
  - 2. Alarms shall be identified on screen by highlighting or underlining or some other easily discernable method.
  - 3. Provide capability of clearing the display on any CRT display.
- E. All existing and new electromagnetic door holders and/or fire alarm activated closers on floor/fire zones of incidence release after a 5 second delay when any alarm is initiated. Doors to remain released until CPU is manually reset.
- F. Activation of initiation device in elevator lobby or equipment room shall initiate elevator recall sequence per ANI/ASME-A17.1, CPU shall send signals to main elevator controller in each independently controlled elevator bank indicating that:
  - 1. An alarm initiation device has been activated on a floor other than the first floor. Use elevator manufacturer's logic at elevator controller to send elevator(s) to first floor on receipt of this signal (Owner's Representative will assist in obtaining logic).
  - 2. An alarm initiation device has been activated on the first floor. Use elevator manufacturer's logic at elevator controller to send elevator(s) to designated alternate floor on receipt of this signal (Owner's Representative will assist in obtaining logic).
  - 3. Activation of 2 pole heat detectors in equipment spaces shall alarm system, and operate elevator circuit breaker shunt trips.

**2.05 SIGNAL INITIATING DEVICES**

- A. Manual Pull Stations: Non-coded single action with internal glass rod and recessed pull lever semi-flush mounting.
- B. Area smoke detectors: Analog addressable plug-in type, 24V DC, 2-wire detectors with an LED indicator which illuminates on signal alarm actuation. Supervise the detector power at the fire alarm control panel.
- C. Automatic thermal sensors: Fixed temperature type or combination rate-of-rise and fixed temperature type. Addressable.
  - 1. Rated at 140 degrees F, for ordinary areas where normal ceiling temperature does not exceed 100 degrees F, or rated 190 degrees F, for up to 150 degrees F, ceiling temperatures.
  - 2. Quantity and spacing:
    - a. Smooth ceilings: In accord with UL rating.
    - b. Non-smooth ceilings: In accord with CSFM's requirements.
  - 3. Layout is based on 30 feet spacing for fixed-type and 50 feet spacing for combination type for smooth ceiling.
  - 4. Provide in areas required by NFPA 72E or as directed by an Owner's Representative.
  - 5. Detector means of testing detector at detector and from CPU.
  - 6. Detector with a flashing status indicating LED for visual supervision. When detector is actuated, flashing LED will latch on steady and at full brilliance.
  - 7. Base capable of accepting analog output sensor.
- D. Automatic smoke sensor: Photoelectric type, products of combustion detectors (Ionization). Addressable.
  - 1. Operate on photoelectric principle, activated by presence of smoke particles.
  - 2. Operating characteristics shall allow detector to remain stable under varying conditions of vibration, mechanical shock, supply voltage, ambient temperature, air flow and barometric variations.
  - 3. Low voltage, solid-state design employing voltage and RF transient suppression.
  - 4. Detector base: Molded construction equipped with terminal screws for all wiring connections, designed for mounting on any standard 4 inch square outlet box for concealed wiring, or special box for surface raceway, provide base with sounder where requested by the Owner.
  - 5. U/L listed to Standard 268 and shall be documented as compatible with control equipment to which it is connected.
  - 6. Detector with a flashing status indicating LED for visual supervision. When detector is actuated, flashing LED will latch on steady and at full brilliance.
  - 7. Operating power supplied from basic 24 volt DC zone circuit.
  - 8. Removal of detector head will interrupt supervisory circuit of zone circuit and cause a trouble signal to be initiated.
  - 9. Detector head easily disassembled to facilitate cleaning.
  - 10. Sensors shall include test provisions which simulate alarm conditions.
  - 11. Sensor sensitivity can be adjusted from building CPU.
  - 12. Base capable of accepting analog output sensor.

13. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
  14. The detectors shall provide address-setting means on the detector head using decimal switches. The detectors shall also store an internal identifying code that the control panel shall use to identify the type of detector.
  15. Using software in the Fire Alarm Control Panel (FACP), the detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72E.
  16. Detectors located within concealed spaces (e.g., duct detectors located above the ceiling/in interstitial spaces) will be provided with readily-accessible remote LED indicators and test/reset stations. Detectors located within normally-locked rooms/spaces (Pharmacy etc.) shall be provided with readily-visible remote LED indicators.
- E. Automatic smoke detectors for ductwork: With appropriate air duct accessory for installation in ducts.
1. Duct smoke detectors shall utilize photoelectric type detector (ionization as specified by local fire department) operating on light scattering photodiode principle as specified by the Owner. Detector to be designed to ignore invisible airborne particles or smoke densities that are below alarm point.
  2. Duct housing mounted directly to outside of duct with a sampling tube extended across duct to sample air movement.
  3. Duct housing couplings slotted to insure proper alignment of sampling and exhaust tubes.
  4. Detector shall have an alarm LED visible through front cover.
  5. U/L listed to Standard 268A and shall be documented compatible with control equipment to which it is connected.
  6. Provide a Remote indicator with remote test for each detector keyed. This device shall be mounted in the hallway under the corresponding duct detector, on the wall, 6 feet 6 inches from the floor and be clearly visible and accessible. The exact location is subject to approval by the Owner's Representative. The faceplate of this unit shall be provided with an identification tag listing the number and the zone that the unit will activate when in the "Test or alarm" mode and the AC unit number, this identification tag shall be engraved with White 1/4 inch lettering on red laminated plastic.
  7. Provide 8 IN square access door with rubber gasket in duct approximately 2 FT upstream from smoke detector for testing and servicing.
  8. Duct detectors shall be addressable, type and shall be similar to smoke sensors described above.
  9. If installed where exposed to the weather duct detectors shall be installed in NEMA 3R enclosures with a hinged door and duct detectors shall be rated for expected temperatures and conditions when placed outside the building. If in the opinion of the Owner's Representative the location that the detector has been installed does not meet the duct detectors operational design criteria the duct detectors shall be moved to a satisfactory location at no additional expense to the Owner.
  10. Duct detectors shall be powered from the FACP or auxiliary supervised 24 V volt power with required battery backup.

- F. Main sprinkler water-flow switch (See plumbing, fire protection, and civil plans.): Provide alarm wiring circuit and make connections from switch terminals to fire alarm system. Provide individual point for main sprinkler water-flow detector.
- G. Sprinkler and standpipe flow alarm switches (See plumbing, fire protection, and civil plans.): Provide alarm wiring circuit and connections from switch terminals to fire alarm system. Provide an individual point for each flow alarm zone.
- H. Main sprinkler water valve and post indicator valve tamper switches (See plumbing, fire protection, and civil plans.): Provide supervision wiring circuit and connections from switch terminals to fire alarm system.
- I. All fire sprinkler control valve tamper switches (for sprinkler and stand pipe valves).
  - 1. Provide supervision wiring circuit and connections from switch terminals to fire alarm system. Tamper switch shall annunciate as an addressable trouble signal.
  - 2. Minimum rated capacity: 7A, 125V AC; 0.025A, 25V DC.
  - 3. Tamper proof and arranged to cause switch operation if unit is removed from its mounting.
  - 4. Mount so as not to interfere with normal operation of valve, adjust to operate within two revolutions of valve control or when stem has moved no more than one-fifth of distance from its normal position.
  - 5. Provide weatherproof die cast aluminum housing, with 3/4 inch tapped conduit entrance, and necessary facilities for attachment to valve.
  - 6. Finish: Red baked enamel.
  - 7. Provide on each O, S & Y valve.
- J. Addressable interface module (if required):
  - 1. Provide interface module for all contact closure devices to provide a complete addressable system. Interface module shall identify a contact closure device such as a tamper switch as a specific point.
  - 2. All monitor modules to be located in a visible location, so device LED can be seen, without having to move any ceiling panels, etc. This may mean lowering the devices and cutting ceiling tile, installing boxes, etc., as required.
  - 3. All monitor modules to be identified with a plastic (white on red) laminated stick-on label indicating device function and identification number.

## **2.06 ALARM SIGNALLING APPLIANCES**

- A. General: Provide the number and location of audible devices necessary to meet the audibility requirements of the codes and standards. Furnish and install additional devices where required and perform tests to show that audible devices meet these requirements.

## **2.07 FIRE ALARM WIRE AND CABLE**

- A. Conduit: 3/4 inch minimum (See Section 26 05 34).
- B. Conductors:
  - 1. Wires shall be stranded copper conductors, except for underground work, THWN insulated. Unless otherwise indicated on plan, minimum size shall be as follow:
    - a. 120V AC and power supply connections: 12GA, minimum.
    - b. Low-voltage general alarm circuits: 14GA, minimum.
    - c. Low-voltage signal initiating circuits: 18GA, minimum.

- d. Annunciator and data communication circuits as required by manufacturer, UL listed.
- e. Use larger wire sizes when recommended by equipment manufacturer and to allow for future expansion.
- f. Systems which recommend shielded wire shall use such wire.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

##### **A. General**

1. Install all components as shown on drawings and in accordance with all codes, and manufacturers' diagrams. If the drawings contradict codes or manufacturers' data sheets, immediately contact the Architect to clarify and correct the problem.
2. Install all components as indicated and in accord with manufacturer's wiring diagrams, instructions and recommendations. Assemble together all equipment which requires assembling including bussing and internal wire connections where required. Connect all incoming conduit, cable and wires properly, and adjust and make ready for service electrical equipment and material required by this Contract.
3. Perform all work in an orderly manner, and present a neat appearing installation when completed.
4. Use plenum rated cable for spaces used for environmental air. In accessible ceiling spaces, use either plenum rated cable or cable in conduit.
5. Install cable in conduit above inaccessible ceiling spaces and in walls.
6. Install cable in raceway for all exposed locations.

##### **B. Equipment**

1. Accurately set and level, neatly placed support and anchor properly. Anchor with bolts to .56G for essential equipment and .22G for nonessential equipment to prevent movements in an earthquake. No allowance will be made for negligence to foreseen or unforeseen means of placing or installing, equipment into position.
2. Install equipment in flammable or explosive atmospheres, which is approved and listed for such application. Install all raceway and fittings in accordance with the CEC for hazardous (classified) locations.
3. Closely coordinate installation of equipment and devices that pertain to work in other Divisions of the Specifications.

##### **C. Devices**

1. Ceiling-type detectors:
  - a. Install where shown on drawings.
  - b. Mount units in accordance with drawings and manufacturer's standard details.
  - c. Locate detectors with indicating light visible from floor, all oriented in the same direction.
  - d. Do not conceal detectors behind HVAC ductwork.
  - e. Do not locate area protection detectors in direct air stream from supply air outlets. Maintain a minimum distance of 3 feet from air outlets.
  - f. Do not install smoke detectors until project area is clean, HVAC system is clean, HVAC system has run for a minimum of 3 hours and construction is finished.
2. Manual pull stations.

- a. Install where shown on drawings.
- b. Mount with center of operating handle at 48 inches above the floor.
- c. Mount units in accordance with drawings and manufacturer's details.

D. Wiring

1. Install all wiring in accordance with CEC, Article 760.
  2. Install all wiring in rigid, intermediate or electrical metallic conduit, minimum conduit size is 1/2 inch. Do not install fire alarm system conductors in conduits, junction boxes or outlet boxes with conductors of any other systems. Install circuits for AC separate from circuits using DC. Install each data loop separate from any other data loops. Install circuits for door holders and other non-power limited circuits in conduits separate from alarm initiating and annunciating circuits. Install all initiating devices and signaling line circuits, above-grade. Provide exposed liquid-tight flexible conduit of the minimum length required for neat and secure installation where used for attachment to water-flow and valve tamper switches or similar applications. Do not bury nor locate flexible conduit closer than 12 inches to grade.
  3. Pack conduit with removable sealant where connected to ceiling or duct detectors.
  4. Paint all conduits except that which is exposed in public areas red in color for six inches at least every 6 feet for the entire circumference of the conduit. Paint all concealed junction boxes red. Label junction boxes "fire alarm" with contrasting colored letters.
- E. Connections: Make wire connections to terminal with terminal spade lugs or to terminal blocks approved for use without lugs. Engage the service of manufacturer's certified technicians to make all final connections.
- F. Identification: Identify all conductors with E-Z Code or Brady wire markers by zones, or equivalent, designation, at all junction boxes, detector outlets, pull stations, strobe, strobe/horn and master terminals.
- G. Grounding: Permanently ground all metallic conduit, cabinets, junction boxes, and exposed non-current-carrying metal parts. Connect a separate No. 10 AWG conductor to a grounding bus bar located in each main terminal cabinet to building ground. Provide the bus bar with a minimum of 5 tubular, pressure type screw terminals, sized for No. 18 AWG through No. 10 AWG wire. Connect the ground wire for the FACP and the main terminal cabinet to the bus bar.

**3.02 PERFORMANCE**

- A. Cutting and patching:
1. As specified in Section 01 73 29 – Cutting and Patching.
  2. Perform all cutting and patching, including structural reinforcing, necessary for this work.
  3. Perform no cutting or patching without prior approval. Repair damage done by cutting and patching equal to original condition.
- B. Provide metal backing plates, anchor plates, and similar items that are required for anchorage for the work of this Section. Securely weld or bolt to metal framing. Wood blocking or backing will not be permitted in combination with metal framing.
- C. Provide special forming, recesses, chases, and similar items and wood blocking, backing, and grounds necessary for the proper installation of the fire alarm system as part of the Work.

**3.03 PROGRAMMING**

- A. Program the system in accord with Owner requirements.

- B. Obtain a list of the room numbers from the Owner's Representative prior to beneficial occupancy of the areas. Correct all final programming and as-built drawings submitted to the Owner's Representative for Operating & Maintenance (O & M) manual to reflect correct room numbers.
- C. Program as follows:
  - 1. Program for supervisory protection connected to the following sensors:
    - a. Area smoke detectors.
    - b. System trouble.
  - 2. Standardize the programming to meet Owner's nomenclature.

### **3.04 TESTING ACCEPTANCE**

- A. Obtain services of a factory trained representative of system manufacturer to supervise installation and its progress, supervise final connections to equipment and provide testing to assure that system is in proper operating condition, and is in compliance with all applicable regulations.
- B. Provide 4 sets of preliminary as-built drawings for mark-up during testing. The Owner will retain these sets. Perform 2 separate tests after the system is completed. Successfully demonstrate as part of each test all functions required in the contract. Complete one test in the presence of the Owner's Representative and conduct a separate test for final acceptance by the CSFM in the presence of the Owner's Representative. Notify the Owner's Representative 5 days before date of performance and acceptance tests.
- C. Furnish all labor and test equipment required for this work. Testing work is defined as that work necessary to establish that equipment has been properly assembled, connected, and checked to verify that intent and purpose of drawings, manufacturer's instruction manuals, and directions of Architect have been accomplished in a satisfactory manner. Perform re-testing of all failures to verify corrections.
- D. Prior to the CSFM test, correct punch list items identified by the Owner's Representative. After re-inspection of punch list items perform additional testing necessary to verify compliance. Continue to correct and retest system until defect-free.
- E. Acceptance testing will include, but not be limited to the following:
  - 1. Test that horns deliver the rated sound pressure levels of the specified device and 10-dB sound level above ambient level.
  - 2. Test that manual pull stations close the specified circuits and cause specified alarm signals.
  - 3. Test that automatic detectors operate when the appropriate fire or smoke conditions are generated.
  - 4. Test that panels and supervisory devices display and control functions specified.
  - 5. Test that fire alarm supervisory and trouble signals are received at the remote alarm station.
  - 6. Test that battery will provide 24 hour backup upon removal of AC power (4 hours if fire alarm system is supplied by emergency power).
  - 7. Turning over and obtaining receipt for completion of NFPA Certification Application Form.
- F. Prior to performing acceptance testing:
  - 1. Verify entire system tests free from opens, grounds, and short circuits.



2. Verify that horns, horn/strobes, manual pull stations, transmitters, automatic detectors and supervisory devices, and all other fire alarm system components are functioning as specified.
  3. Verify that all individual circuits are connected at panel for proper operation.
  4. Verify control circuit integrity:
  5. Verify component compliance with specifications,
  6. Open initiating device circuits and verify that the trouble signal actuates.
  7. Open and short signaling line circuits and verify that the trouble signal actuates.
  8. Open and short indicating appliance circuits and verify that trouble signal actuates.
  9. Ground all circuits and verify response of trouble signals.
  10. Check presence and audibility of all alarm notification devices.
  11. Check installation, supervision, and operation of all intelligent smoke detectors.
- G. Ground tests shall meet requirements of California Code of Regulations (CCR), Title 24, Part 3.
- H. After completion of testing and adjustment, operate the different systems and equipment under normal working conditions and show specified performance. If, in the opinion of the Architect, performance of equipment or systems is not in accordance with Specifications or submitted data, alter or replace equipment at no increase in Contract Sum.
- I. Do not allow or cause any work to be covered up or enclosed before it has been inspected and approved. Should any work be enclosed or covered up before it has been approved, uncover such work and after it has been inspected and approved, make all repairs necessary to restore work condition in which it was found at time of cutting, all at no increase in Contract Sum.
- J. Before requesting final approval of the installation, furnish a written statement to the CSFM to the effect that the system has been installed and completely tested in accordance with (2010) NFPA 72 Sections 10.18.1.3 and 14.4.1.2.

**3.05 SEQUENCE OF OPERATION**

- A. Provide in an electronic format (PDF) a clear and concise description of sequence of operations that gives, in detail, the information required to operate properly the equipment and system.

**END OF SECTION 28 46 00**

**SECTION 31 10 00 - SITE CLEARING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities or abandoning site utilities in place.

B. Related Sections:

1. Section 01 50 00 "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities, and temporary erosion- and sedimentation-control measures.
2. Section 01 56 39 "Temporary Tree and Plant Protection" for general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
3. Section 01 71 23 "Field Engineering" for field engineering and surveying.

1.3 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 REFERENCES

- A. Geotechnical Investigation: titled: **"Geotechnical Engineering Report, SJCOE Code Stack Academy, prepared by Mid Pacific Engineering, Inc., MPE No. 06357-01, prepared April 18, 2024.**

- B. Perform on-site and off-site work in accordance with these specifications, City of Stockton and CalTrans Standard Specifications.
- C. Perform Work within the street right-of-way in accordance with these specifications, City of Stockton and CalTrans Standard Specifications.

1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable City, County, State and Federal Regulations and/or codes for environmental requirements, handling and disposal of debris, and use of herbicides.
- B. The City of Stockton is the jurisdictional agency within the public road/street right-of-ways. An encroachment permit must be obtained from City of Stockton by the Contractor prior to performing any work within the road/street right-of-ways. The Contractor will be reimbursed by the Owner for the fees associated with the encroachment permit.

1.6 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.7 SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - 1. Use sufficiently detailed photographs or videotape.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.8 QUALITY ASSURANCE

- A. Pre-site clearing Conference: Conduct conference at Project site.

1.9 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Public Utility Locator Service: Contact Underground Service Alert (USA) at 1-800-227-2600 for the locating of existing public utilities in the area where the project is located before site clearing.

- D. Private Underground Utility Locator Service Company: In addition to contacting USA, the Contractor shall secure the services of a private Underground Utility Locating Service Company to locate existing utilities in the area where the project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- F. The following practices are prohibited within tree and landscape areas identified to remain unless with written permission from the Owner:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging, unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Prohibit heat sources, flames, ignition sources, and smoking within or near tree and landscape areas identified to remain.
- H. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.
- I. The use of explosives and burning on site is prohibited.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving."
  - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch blue vinyl tie tape flag around each tree trunk at 54 inches above the ground.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### **3.2 TREE AND PLANT PROTECTION**

- A. Refer to Section 01 56 39 "Temporary Tree and Plant Protection."

**3.3 EXISTING UTILITIES**

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
- B. Excavate for and remove underground utilities indicated to be removed.

**3.4 CLEARING AND GRUBBING**

- A. Clear site of existing structures designated for removal as indicated on drawings. Where practical, site clearing operations should extend laterally a minimum of five feet beyond the limits of the proposed structural areas of the site.
- B. Clear areas required for access to site and execution of work.
- C. Grub site as indicated on drawings. At a minimum, grubbing should extend laterally a minimum of five feet beyond the limits of the proposed structural areas of the site. The grubbed material will not be suitable for use as engineered fill.
- D. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Any tree removal shall include the root ball and roots larger than ½ inches in diameter. Adequate removal of roots may require laborers and handpicking to clear the subgrade soils to the satisfaction of the Geotechnical Engineer.
- E. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Backfill of tree root excavations shall not be permitted until all exposed surfaces have been inspected and the Geotechnical Engineer is present for the proposed control of backfill placement and compaction.
  - 2. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials.
  - 3. Place fill material in horizontal layers not exceeding a loose depth of 6 inches, moisture conditioned (2 percentage points above the optimum moisture content) as necessary and compact each layer to at least 90 percent of maximum dry density per ASTM D1557.

**3.5 SITE IMPROVEMENTS**

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

**3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

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

- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

**END OF SECTION 31 10 00**

**SECTION 31 20 00 - EARTH MOVING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preparing subgrades for building foundations, slabs-on-grade, walks, vehicle pavements, turf and grasses, and plants.
2. Excavating and backfilling for buildings and structures.
3. Lime Treatment.
4. Free draining gravel course for concrete slabs-on-grade.
5. Aggregate base course for concrete walks and vehicle pavements.
6. Aggregate base course for asphalt paving.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:

1. Section 01 50 00 "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also, for temporary site fencing if not in another Section.
2. Section 03 30 00 "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
3. Section 31 10 00 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
4. Section 31 50 00 "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.

1.3 DEFINITIONS

- A. Aggregate base Course: Aggregate layer placed between the subgrade and hot-mix asphalt or concrete paving.
- B. Backfill: Soil material or controlled low-strength material used to fill an excavation.
  1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- C. Bedding Course: Aggregate layer (sand with a sand equivalent of at least 30 or the pipe manufacturer's requirements, whichever is more restrictive) placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Free Draining Gravel Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
- G. Fill: Soil materials used to raise existing grades.

- H. Mixing Table: A Lime-Treatment construction method whereby the soils that have been stockpiled can be spread out in a thin lift in a convenient area adjacent to the excavation, and a standard spreader machine and rotary mixer is used to treat the soils.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### 1.4 REFERENCES

- A. Geotechnical Investigation: titled: **“Geotechnical Engineering Report, SJCOE Code Stack Academy, prepared by Mid Pacific Engineering, Inc., MPE No. 06357-01, prepared April 18, 2024.**
- B. Standard Caltrans Specifications, 2023 edition.
- C. Perform on-site and off-site work in accordance with these specifications, City of Stockton Standard Specifications, and Caltrans Standard Specifications.
- D. Perform Work within the street right-of-way in accordance with these specifications, City of Stockton Standard Specifications and Caltrans Standard Specifications.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
  - 1. Controlled low-strength material, including design mixture.
  - 2. Warning tapes.
  - 3. Mix design for Lime Treatment as determined by owner’s testing laboratory. (14 days prior to start of grading operations.)
- B. Samples: For the following products, in sizes indicated below:
  - 1. Warning Tape: 12 inches long; of each color.
  - 2. Lime: One 10-pound sample of each lime product proposed and from each source. (Samples to be given to owner’s testing laboratory to assist in determination of Lime Treatment Mix Design.)
- C. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
  - 1. Classification according to ASTM D 2487.
  - 2. Laboratory compaction curve according to ASTM D 1557.
- D. Certification: For each borrow soil material proposed for fill and backfill shall be certified by the Contractor and supplier (to the satisfaction of the Owner) that the soils do not contain any environmental contaminates regulated by local, state, or federal agencies having jurisdiction. This certification shall consist of, as minimum, analytical data specific to source of the import material in accordance with the Department of Toxic Substances Control, “Informational Advisory, Clean Imported Fill Material,” dated October 2001.
- E. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.



1.6 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
  - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Utility Locator Service: Contact Underground Service Alert (USA) at 1-800-227-2600 for the locating of existing utilities in the area where the project is located before beginning earth moving operations.
- D. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Section 01 50 00 "Temporary Facilities and Controls are in place.
- E. Seasonal Limits: Fill material shall not be placed, spread, or rolled during unfavorable weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until field tests indicated that the moisture contents of the subgrade and fill materials are satisfactory.
- F. Soils beneath existing asphalt pavements, exterior flatwork, and slab areas will likely be at an elevated moisture content regardless of the time of year of construction. It may be necessary to scarify and allow the soils beneath the existing pavements to dry for a period of time after the pavements are removed. Such soils, intended for use as engineered fill, will require a prolonged period of dry weather and/or considerable aeration to reach a moisture content suitable for proper compaction.
- G. Lime-treated material shall not be mixed or spread while the atmospheric temperature is below thirty-five degrees Fahrenheit (35°F). The entire mixing operation shall be completed within seventy-two (72) hours of the initial spreading of lime, unless otherwise permitted by the Geotechnical Engineer.
- H. The following practices are prohibited within landscape and tree areas identified to remain unless permission is granted by owner:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Heavy Foot traffic.
  - 4. Erection of temporary sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- I. Prohibit heat sources, flames, ignition sources, and smoking within landscape and tree areas identified to remain.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

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

- B. Unsatisfactory Soils: Soil Classification Groups GC, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained at the minimum optimum moisture content at time of compaction as determined by ASTM D1557 test method.
  - 2. Clean sand or very sandy soil. A sandy soil will allow the surface water to drain into the expansive clayey soil below, which may result in soil swelling.
- C. Imported Non-Expansive Engineered Fill: Imported fill materials shall be approved by the Geotechnical Engineer; shall be well graded, slightly cohesive, fine silty sand, or sandy silt, with relatively impervious characteristics when compacted. At least seven days prior to the placement of any fill, the engineer shall be notified of the source of materials and samples of the proposed fill shall be submitted to the Laboratory of Record for Testing and shall be approved by the Geotechnical Engineer of Record prior to being brought to the site. The imported fill shall possess the following characteristics:
  - 1. Free of particles greater than three inches in maximum dimension.
  - 2. Plasticity Index: 15 or less.
  - 3. Expansion Index: 20 or.
- D. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a No. 4 sieve and not more than 8 percent passing a No. 200 sieve.
- E. Class 2 Aggregate Base Course: Clean mixture of 3/4-inch natural or crushed gravel, crushed stone, and natural or crushed sand complying with Caltrans Standard Specification, Section 26, Class 2.
- F. Free Draining Gravel Course (Capillary Barrier Material): Free Draining Gravel Course material under floor slabs shall be provided to the thickness shown on the Drawings. This material shall be clean gravel or crushed rock of 3/4-inch maximum size, with no appreciable material passing a number four (#4) sieve.
- G. Treated Soils: Materials to be lime-stabilized shall be on-site clayey sand, clayey sand with gravel, and sandy clay or approved import clay soils free from significant quantities of rubble, rubbish, and vegetation and shall have been tested and approved by the Geotechnical Engineer.
- H. Lime: ASTM C 977 and the requirements in the following table:

**Lime Quality**

Property	ASTM	Requirements
Available calcium and magnesium oxide (min, %)	C 25 or C 1301 and C 1271	High calcium quicklime: CaO > 90 Dolomitic quicklime: CaO > 55 and CaO + MgO > 90
Loss on ignition (max, %)	C 25	7 (total loss) 5 (carbon dioxide) 2 (free moisture)
Slaking rate	C 110	30 °C rise in 8 minutes

- 1. A 0.50 lbs. sample of lime dry-sieved in a mechanical sieve shaker for 10 minutes +/- 30 seconds must comply with the grading requirement of at least 98 percent passing a 3/8-inch sieve.

2. In addition to the above, the use of alternative lime products which are of equal quality and of the required characteristics for the purpose intended will be permitted, subject to the following requirements:
  - a. The burden of proof as to quality and suitability of alternatives shall be upon the Contractor and/or Supplier and they shall furnish test data and all information necessary as required by the Geotechnical Engineer. Written request for alternatives, accompanied by complete data as to the quality and suitability of the material shall be made in ample time to permit testing and approval without delaying the work. The Geotechnical Engineer shall be the sole judge as to the quality and suitability of alternatives and their decision shall be final. Documentation shall be provided to the Geotechnical Engineer no later than two weeks before the alternative material is imported to the site.
  - b. Lime from more than one source or more than one type may be used on the same project but the different limes shall not be mixed.
  - c. The lime shall be protected from moisture until used and shall be sufficiently dry to flow freely when handled.
- I. Sand: ASTM C 33; fine aggregate.
- J. Water: Water for use in subgrade stabilization shall be clean and potable, and shall be added during mixing, remixing, and compaction operations, and during the curing period to keep the cured material moist until covered.

## 2.2 CONTROLLED LOW-STRENGTH MATERIAL (CDF)

- A. Controlled Low-Strength Material (CDF): Self-compacting, low-density, flowable concrete material produced from the following:
  1. Portland Cement: ASTM C 150, Type II.
  2. Fly Ash: ASTM C 618, Class C or F. The fly ash shall not inhibit the entrainment of air.
  3. Normal-Weight Aggregate: ASTM C 33, 3/8-inch nominal maximum aggregate size.
  4. Water: ASTM C 94.
  5. Air-Entraining Admixture: ASTM C 260. Air entrainment shall not exceed 20 percent.
- B. Produce conventional-weight, controlled low-strength material with 50-psi to 150-psi compressive strength when tested according to ASTM C 495.

## 2.3 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 4 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
  1. Red: Electric.
  2. Yellow: Gas, oil, steam, and dangerous materials.
  3. Orange: Telephone and other communications.
  4. Blue: Water systems.
  5. Green: Sewer systems.
- B. Water: Potable water free from oil and shall contain no more than 650 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO<sub>4</sub>. The water shall not contain an amount of impurities that will cause a reduction in the strength of the stabilized material.

- C. Curing Seal: Caltrans Section 94, Grade SS1, SS1h, CSS1, or CSS1h.

### PART 3 - EXECUTION

#### 3.1 LAYOUT AND PREPARATION

- A. Lay out all work, establish grades, locate existing underground utilities, set markers and stakes, set up and maintain barricades and protection of utilities and trees and vegetation to remain – all prior to beginning actual earthwork operations.
- B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- C. Protect and maintain erosion and sedimentation controls during earth moving operations.
- D. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.
- E. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- F. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

#### 3.2 EXPLOSIVES

- A. Explosives: Do not use explosives.

#### 3.3 EXCAVATION, GENERAL

- A. Excavate to lines and levels required for construction of the work indicated on the drawings.
- B. Replace damaged or displaced subsoil to same requirements as for non-expansive engineered fill.
- C. Prevent displacement or loose material from falling into excavation, maintain soil stability. Comply with the requirements of Title 8, CCR, Sections 1539 – 1543.
- D. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- E. Temporary excavations shall be left open for as short of time as possible.
- F. Notify Owner's Representative of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- G. Stockpile excavated material in area designated on site. Excavated materials shall not be stockpiled directly adjacent to an open excavation to prevent surcharge loading of the excavation sidewalls. Excessive truck and equipment traffic shall be avoided near excavations. If material or heavy equipment is stationed and/or operated near an excavation, a shoring system shall be designed to resist the additional pressure due to the superimposed loads. Remove excess or unsuitable material from site or stockpile on site as directed. Contractor shall work with the district and the site to determine the best location for stockpiling of excavated material.
- H. Permanent excavation and fill slopes shall be constructed no steeper than two horizontal to one vertical (2:1). Revegetation of the slopes as soon as possible following grading will help reduce erosion.
- I. The site is surrounded by existing structures. Associated with these developments is the potential for buried structures, such as utility lines that may extend into the site. Any buried structures, including loosely backfilled excavations or utilities, encountered excavation work shall be properly removed and/or relocated as directed by the Architect and Geotechnical Engineer. Excavations, depressions, or soft and pliant areas extending below planned finish subgrade level shall be

cleaned to firm undisturbed soil so they may be backfilled during filling operations. In general, septic tanks, debris pits, cesspools, or similar structures shall be entirely removed. Concrete footings shall be removed to an equivalent depth of at least 3 feet below proposed footing elevations. Any other buried structures shall be removed in accordance with recommendations of the Geotechnical Engineer. The resulting excavations shall be ready so they may be backfilled during filling operations.

### 3.4 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
- B. Underpin adjacent structures, which may be damaged by excavating work.
- C. Excavate subsoil to accommodate site structure foundations, mat slab, and slabs-on-grade. Existing footings and the mat slab will bear on helical piles and either undisturbed native soils or Imported Non-Expansive Engineered Fill. The bottom of mat slab excavations shall be cleaned of loose materials, scarified to a depth of 6 inches, worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and recompacted to a minimum of 90 percent maximum density based on ASTM D1557.
- D. Voids resulting from the removal of any buried structures (such as irrigation structures or pipes, foundations, tanks, septic systems, sewer lines, water lines and storm drain lines) shall be cleared of all loose soil and debris so that they may be backfilled during filling operations.

### 3.5 SUB-EXCAVATION

- A. Over excavation within the site used for accessory structures, drive aisles, parking, and walkways shall extend to a depth of at least 24 inches below final subgrade or existing grade, whichever is deeper. The zone of over excavation shall extend laterally at least 5 feet beyond the perimeter of the proposed improvements where possible.
- B. The exposed subgrade shall be ripped and cross-ripped to a depth of 12 inches and exposed remnants from former development removed to expose firm and stable conditions as identified by the Geotechnical Engineer. Screening or hand-picking may be required to remove rubble, debris, and over sized materials to allow proper lime-treatment and fill construction.
- C. Following compaction, the excavations shall be backfilled with properly lime-treated soils to construct a minimum 24-inch-thick layer of lime-treatment. Lime-treatment shall consist of spreading, mixing, and compaction in maximum 12-inch layers within the excavation, or alternately, or in addition to, a "mixing table" could be used. Alternately, the soils can be placed as a thin lift within the excavation and treated. Once treated, mixed, and remixed, the soils can be placed and compacted as engineered fill.
- D. **Add Alternate:** In lieu of lime-treatment, a minimum 24-inch-thick layer of imported class 2 aggregate base may be used. The aggregate base shall be installed in maximum 6-inch lifts with each lift compacted to 95 percent relative compaction. This aggregate base layer is in addition to the aggregate base layers required beneath site improvements.
- E. If soft or yielding soils are exposed by this processing, excavation shall continue until still, non-yielding soils are encountered. The depth and extent of required over excavations shall be approved in the field by the Geotechnical Engineer prior to placement of fill or improvements.
- F. See paragraph 3.13 – Lime Treatment.

### 3.6 EXCAVATION FOR UTILITY TRENCHES

- A. Comply with Title 8, CCR, Sections 1539 through 1541. Utility trenches shall be excavated according to accepted engineering practices by a contractor experienced in such work. The responsibility for the safety of open trenches shall be borne by the Contractor. Traffic and vibrations adjacent to trench wall shall be limited; cyclic wetting and drying of excavation side

slopes shall be avoided. Depending on the location and depth of some utility trenches, groundwater flow into excavations could be experienced; especially during or following periods of precipitation.

- B. To prevent loss of both lateral and vertical support of foundations that could result in possible settlement, comply with the following:
  - 1. Underground utility trenches that are aligned nearly parallel with the foundations shall be at least three feet from outer edges of foundations.
  - 2. Trenches shall not encroach in the zone extending outward one horizontal to one vertical inclination below the bottom of the foundations.
  - 3. Trenches parallel to existing foundations shall not remain open longer than 72 hours.
- C. Excavate trenches to indicated gradients, lines, depths, and elevations.
- D. Based on the soil conditions encountered at the site, trench excavations likely will stand at near-vertical inclination for short periods of time, unless zones or pockets of clean cohesionless sands are encountered or the trenching is performed during the rainy season. Excavations encountering perched water, saturated soils, or excavations exposing granular, silty sand soils may slough or cave if left open for extended period of time requiring sloped requiring sloped excavations and other stabilization methods.
- E. For trenches 5'-0" or deeper, the general contractor, in advance of excavation, shall secure a permit through the Division of Occupational Safety and Health. The contractor shall submit a detailed plan showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches to the District through the Architect.
- F. When sloping of sidewalls is employed the contractor shall consult with the geotechnical engineer to determine maximum slope.
- G. Excavate trenches to uniform widths (unless otherwise prohibited) to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
  - 1. Clearance: 6 inches each side of pipe or conduit.
- H. Trench Bottoms: Excavate trenches 12 inches deeper (minimum) than invert of pipe and conduit elevations to allow for bedding course. Hand excavate deeper for bells of pipe.
- I. Off haul trench spoils in lime treated areas as the material cannot be reused for utility trench backfill.

### 3.7 SUBGRADE INSPECTION

- A. Notify Architect and Geotechnical Engineer when excavations have reached required subgrade.
- B. If Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Geotechnical Engineer, without additional compensation.

### 3.8 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
  - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

**3.9 STORAGE OF SOIL MATERIALS**

- A. Stockpile borrow soil materials and excavated soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

**3.10 BACKFILL**

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring and bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

**3.11 BACKFILL BENEATH EXISTING SIDEWALK**

- A. The portion of the basement underneath the existing sidewalk will not be included in the new development and will be backfilled.
- B. At a minimum, holes shall be cut into the slab to allow for drainage. Fill the holes with drain rock and cover with geotextile fabric to reduce settlement.
- C. Backfill with class 2 aggregate base compacted to 95% relative compaction.

**3.12 UTILITY TRENCH BACKFILL**

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Utility trench backfill shall be mechanically compacted as engineered fill in accordance with the following recommendations. Bedding of utilities and initial backfill around and over the pipe and conduits shall be in accordance with the manufacturer's recommendations for the pipe materials selected and applicable community and utility provider requirements. Utility trench backfill shall be continuously observed by a representative of the Geotechnical Engineer during Construction.
- C. Place and compact 12-inch minimum bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- D. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with Imported Non-Expansive Engineered Fill or fill with concrete to elevation of bottom of footings. Concrete is specified in Section 03 30 00 "Cast-in-Place Concrete."
- E. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 03 30 00 "Cast-in-Place Concrete."
- F. Utility trench backfill shall be placed in relatively thin lifts, moisture conditioned to at least two percent above the optimum moisture content and mechanically compacted to at least 90 percent of the ASTM D 1557 maximum dry density. The actual lift thickness used will depend on the compaction equipment used, but shall not be more than 12 inches (compacted thickness). Within

the upper 12 inches of pavement areas, the minimum compaction should be increased to 95 percent of ASTM D 1557.

- G. Backfill for the upper inches of trenches shall match the adjacent materials. That is, if the upper inches of subgrades for the building pad (imported non-expansive engineered fill) and exterior flatwork (aggregate base), the upper inches of trench backfill shall consist of the same materials or Class 2 aggregate base in a matching thickness, but not less than 12 inches. If the upper inches of the improvement areas consist of lime-treated soils, the matching upper inches, but not less than 12 inches, of trench backfill shall consist of Controlled Low-Strength Materials or Class 2 Aggregate Base.
- H. Backfill voids with general engineered fill while removing shoring and bracing.
- I. Place and compact initial backfill of bedding material to a minimum height of 12 inches of 1/8 the height of soil backfill over the pipe or conduit, whichever is greater.
  - 1. Pipe bedding and envelope shall be brought to near optimum moisture content, carefully placed in loose lifts not exceeding 6 inches, and compacted to at least 90 percent of maximum density base on ATSM D1557. Compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- J. Controlled Low-Strength Material (where lime treatment is used): Place initial backfill of controlled low-strength material to a height of 12 inches over the pipe or conduit. Coordinate backfilling with utilities testing.
- K. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

### 3.13 LIME TREATMENT

- A. Placing Material: The material to be treated shall be placed at a moisture content at least 2 percent (2%) over optimum moisture as defined by the ASTM D1557 Compaction Test.
- B. Preparing Material: The excavated on-site native clay soils that are free of organic material, rubble, and debris may be reused for fill placement, provided they are lime treated.
- C. Lime Treatment – The native clay soils shall be treated with a percentage of high calcium lime based on the dry unit weight of the soil. For bidding purposes, the Geotechnical Engineering recommends a minimum spread rate of at least 5 pounds of quicklime per square foot of mixing depth (at least 12 inches) based on 4 ½ percent by dry weight of soil to be treated assumed to have a dry unit weight of 110 pcf. The actual amount of lime to be used shall be determined by the Geotechnical Engineer by laboratory testing at least 14 days prior to start of grading operations.
- D. Lime shall be spread by equipment which will uniformly distribute the required amount of lime for the full width of the prepared material. The rate of spread per linear foot of blanket shall not vary more than five percent (5%) from the designated rate.
- E. The spread lime shall be prevented from blowing by suitable means selected by the Contractor. Quicklime shall not be used to make lime slurry. The spreading operations shall be conducted in such a manner that a hazard is not present to construction personnel or the public. All lime spread shall be thoroughly ripped in, or mixed into, the soil the same day lime spreading operations are performed.
- F. The distance which lime may be spread upon the prepared material ahead of the mixing operation shall be determined by the Contractor.
- G. No traffic other than the mixing equipment will be allowed to pass over the spread lime until after the completion of mixing.



- H. Mixing equipment shall be equipped with a visual depth indicator showing mixing depth, an odometer, or footmeter to indicate travel speed and a controllable water additive system for regulating water added to the mixture.
- I. Mixing equipment shall be of the type that can mix the full depth of the treatment specified and leave a relatively smooth bottom of the treated section. Mixing and remixing, regardless of equipment used, will continue until the material is uniformly mixed (free of streaks or pockets of lime), moisture is at approximately two percent (2%) over optimum and the mixture complies with the following requirements:

<u>Sieve Size</u>	<u>Minimum Percent Passing</u>
1 ½"	100
1"	95
No. 4	60

- J. Non-uniformity of color reaction when the treated material, exclusive of one inch or larger clods, is tested with the standard phenolphthalein alcohol indicator, will be considered evidence of inadequate mixing.
- K. Spreading and Compacting – The treated mixture shall be spread to the required width, grade and cross section. The maximum compacted thickness of a single layer may be determined by the Contractor provided they can demonstrate to the Geotechnical Engineer that their equipment and method of operation will provide uniform distribution of the lime and the required compacted density throughout the layer. If the contractor is unable to achieve uniformity and density throughout the thickness selected, the Contractor shall rework the affected area using thinner lifts until a satisfactory treated subgrade meeting the distribution and density requirements is attained, as determined by the Geotechnical Engineer, at no additional cost to the Owner.
  - 1. The finished thickness of the lime-treated material shall not vary more than one-tenth foot (0.1') from the planned thickness at any point.
  - 2. The lime-treated soils shall be compacted to a relative compaction of not less ninety-five percent (95%) as determines by the ASTM D1557 Compaction Test.
  - 3. Initial compaction shall be performed by means of a sheepsfoot or segmented wheel roller. Final rolling shall be by means of steel-tired or pneumatic-tired rollers.
  - 4. Areas inaccessible to rollers shall be compacted to meet the minimum compaction requirement by other means satisfactory to the Geotechnical Engineer.
  - 5. Final compaction shall be completed within twenty-four (24) hours of final mixing. The surface of the finished lime-treated material shall be the grading plan and at any point shall not vary more than eight one hundredths of a foot (0.08') above or below the grade established by the Civil Engineer.
  - 6. Before final compaction, if the treated material is above the grade tolerance specified in this section, uncompacted excess material may be removed and used in areas inaccessible to mixing equipment. After final compaction and trimming, excess material shall be rolled with steel or pneumatic-tired rollers. Minor indentations may remain in the surface of the finished material so long as no loose material remains in the indentations.
  - 7. At the end of each day's work, a construction joint shall be made in thoroughly compacted material and with a vertical face. After a part-width section has been completed, the longitudinal joint against which additional material is to be placed shall be trimmed approximately three inches (3") into treated material, to the neat line of the section with a vertical edge. The material so trimmed shall be incorporated into the adjacent material to be treated.

- a. An acceptable alternate to the above construction joints, if the treatment is performed with cross rotary mixers, is to actually mix three inches (3") into the previous day's work to assure a good bond to the adjacent work.
  - L. Curing – The surface of each compacted layer of lime-treated material shall be kept moist until covered by a subsequent layer of lime-treated material for a period of at least three (3) days or by applying a curing seal immediately following final trimming and rolling of the lime-treated layers.
    - 1. A curing seal will be required only for the top layer of lime-treated material. The curing seal shall consist of CRS or CSS grade asphaltic emulsion and shall be furnished and applied in accordance with the provision of Caltrans Standard Specifications Section 94, "Asphaltic Emulsions."
    - 2. Curing seal shall be applied at a rate of approximately fifteen one-hundredths (0.15) gallons per square yard of surface. The curing seal shall be applied as soon as possible after the completion of final rolling and before the temperature falls below forty degrees Fahrenheit (40°F).
    - 3. No equipment or traffic shall be permitted on the lime-treated material during the first three (3) days after applying the curing seal, unless permitted by the Geotechnical Engineer. Aggregate base materials shall be placed within seven (7) days following application of the curing seal, unless otherwise permitted by the Geotechnical Engineer.
    - 4. The contractor shall repair damaged curing seal the same day the damage occurs.
    - 5. Maintain the moist material blanket above the optimum moisture content until the next structural layer is placed.
  - M. At landscape planting areas, remove lime-treated soils down to native subgrade and replace with quality import topsoil to a depth that will accommodate the root zone of the intended plantings.
  - N. At bioretention areas, remove lime-treated soils down to native subgrade to allow for installation of soil and permeable aggregates (no fines) per Bioretention details on sheet SQ2 in the Civil Drawings.
- 3.14 SOIL FILL
- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 2 horizontal so fill material will bond with existing material.
  - B. Place and compact fill material in layers to required elevations of subgrade as follows:
    - 1. Under planted areas, use clean native or imported soil.
    - 2. Under exterior concrete flatwork, use non-expansive engineered fill and/or lime treated native soil and imported fill.
    - 3. Under city sidewalks, use non-expansive engineered fill.
    - 4. Under asphalt pavement, use imported non-expansive engineered fill and/or lime treated native soil and imported fill.
    - 5. Under interior and exterior concrete building slabs, use imported non-expansive engineered fill.
    - 6. Under footings and foundations, use imported non-expansive engineered fill
  - C. Seasonal Limits: Fill material shall not be placed, spread, or rolled during unfavorable weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until filed tests indicated that the moisture contents of the subgrade and fill materials are satisfactory.

**3.15 SOIL MOISTURE CONTROL**

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to 2 percentage points above optimum moisture content as determined in the ASTM D1557 test method.
  - 1. The optimum moisture content will be determined by the Geotechnical Engineer, who will supply this information to the contractor.
  - 2. The moisture conditioning of the subgrade is highly dependent on the time of year of construction. The Geotechnical Engineer shall be present to observe the exposed subgrade and will specify the moisture conditioning required for the subgrade.
  - 3. If necessary, to obtain uniform distribution of moisture, water shall be added to each layer by sprinkling and the soil disked, harrowed, or otherwise manipulated after the water is added.
  - 4. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 5. When the moisture content of the fill material is too high to permit the specified degree of compaction to be achieved, the fill material shall be aerated by blading or other methods until the moisture content is satisfactory.

**3.16 COMPACTION OF ENGINEERED AND LIME-TREATED BACKFILL**

- A. Compaction shall be achieved where possible, using a heavy, self-propelled, sheepfoot compactor.
- B. Compaction must be performed in the presence of the Geotechnical Engineer, or their representative, who will evaluate the performance of the subgrade under compactive loads and identify any loose or unstable soil conditions that could require additional excavation. If unstable areas are exposed during the compaction operations, those areas experiencing instability shall be removed to a firm base and backfilled with engineered fill.
- C. Place backfill in horizontal layers not more than 6 inches in compacted thickness by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to promote uniformity of material in each layer.
- D. Place backfill evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Backfill shall be properly benched into excavation side slopes to remove loose soils and to promote uniformity of fill construction and support.
- E. The maximum dry density will be determined by the Geotechnical Engineer, who will supply this information to the contractor.
- F. Compact backfill to not less than the following percentages of maximum dry density according to ASTM D 1557:
  - 1. Under structures, building slabs, and steps, compact each layer of backfill material at 90 percent relative compaction (ASTM D 1557).
  - 2. Under asphalt and concrete vehicle pavements (not walkways), compact initial and subsequent layers of backfill or fill soil material at 90 percent relative compaction (ASTM D 1557) and compact the upper 12 inches of backfill to at least 95 percent relative compaction (ASTM D 1557).
  - 3. Under concrete walkways compact each layer of backfill or fill soil material at 90 percent relative compaction (ASTM D 1557).
  - 4. Under landscaped or unpaved areas, compact each layer of backfill or fill soil material at 85 percent relative compaction (ASTM D 1557).

5. Under bioretention areas, no scarification and compaction of native soils is required.
6. Utility Trench Backfill per Paragraph 3.12.

**3.17 GRADING**

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  1. Landscape and Bioretention Areas: Plus or minus 1 inch.
  2. Walks: Plus or minus 1 inch.
  3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

**3.18 CLASS 2 AGGREGATE BASE COURSES UNDER PAVEMENTS AND WALKS**

- A. Place class 2 aggregate base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place class 2 aggregate base course under pavements and walks as follows:
  1. Shape base course to required crown elevations and cross-slope grades.
  2. Place base course 6 inches or less in compacted thickness in a single layer.
  3. Place base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  4. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry density with a minimum moisture content of at least optimum as obtainable by the ASTM D 1557 test method.

**3.19 FREE DRAINING GRAVEL COURSE UNDER CONCRETE SLABS-ON-GRADE**

- A. Place free draining gravel course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact free draining gravel course under cast-in-place concrete slabs-on-grade as follows:
  1. Place free draining gravel course 6 inches or less in compacted thickness in a single layer.

**3.20 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
  1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  2. Determine that fill material and maximum lift thickness comply with requirements.
  3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections. The contractor shall notify the Geotechnical Engineer at least two (2) working days prior to commencement of any aspect of the site earthwork.

- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, footing shall be clear of loose soil and debris. Verification and approval of footing subgrade shall be performed by the Geotechnical Engineer's representative before reinforcement is placed.
- E. Testing agency will test compaction of soils in place according to ASTM D 1557, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
  - 2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.
- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained. No deviations from the specifications shall be made except upon written approval of the Geotechnical Engineer and the Architect.

### 3.21 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, lime treated spoils, trash, and debris, and legally dispose of them off Owner's property.

**END OF SECTION 31 20 00**

**SECTION 31 23 23.43 - GEOFOAM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Rigid plastic foam block fill and accessory materials.

**1.02 RELATED REQUIREMENTS**

- A. Section 31 20 00 – Earth Moving Removal and handling of soil to be re-used.

**1.03 DEFINITIONS**

- A. Finish Grade Elevations: Indicated on drawings.
- B. Subgrade Elevations: Indicated on drawings.

**1.04 REFERENCE STANDARDS**

- A. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2019.
- B. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).
- C. ASTM D7557/D7557M - Standard Practice for Sampling of Expanded Polystyrene Geofoam Specimens; 2009 (Reapproved 2021).

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Manufactured Fill.
- C. Shop Drawings for Manufactured Fill.
  - 1. Submit plan, section, and profile drawings. Indicate size, type, location, and orientation of each geofoam block.
  - 2. Submit location and type of connectors.
  - 3. Indicate proposed weighting or guying.
- D. Materials Sources: Submit name of imported materials source.
- E. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
- F. Manufacturer's Instructions.
- G. Manufacturer's Qualification Statement.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. Manufactured Fill - Geofoam: Review manufacturer's care and handling instructions. Prevent damage to material during delivery, storage, and construction activity.
  - 1. Cover stored geofoam with opaque material when geofoam will be exposed to sunlight for more than six months.
  - 2. Protect material from organic solvents, petroleum-based solvents, and open flame.

3. Follow manufacturer's written procedures for handling and installation of geofoam material.
4. Do not place heavy construction equipment or vehicles directly onto geofoam material.
5. Replace geofoam material damaged when by construction equipment or activity, or repair according to manufacturer's written repair criteria and procedures.

#### **1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide ten year manufacturer warranty for manufactured fill material.

### **PART 2 PRODUCTS**

#### **2.01 MATERIAL**

- A. Manufactured Fill - Geofoam: Rigid foam plastic blocks.
  1. Material: Expanded polystyrene (EPS), clearly marked with manufacturer name and product type.
  2. Adhesive: Urethane construction adhesive, recommended by geofoam manufacturer.
  3. Manufacturers:
    - a. Atlas Molded Products, a Division of Atlas Roofing Corporation; Atlas Geofoam: [www.atlasmoldedproducts.com](http://www.atlasmoldedproducts.com).
    - b. Insulfoam LLC; InsulFoam GF: [www.insulfoam.com](http://www.insulfoam.com).
    - c. EPS Structural Foam Foundation Blocks; Geofoam International LLC.
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Identify required lines, levels, contours, and datum locations.

#### **3.02 PREPARATION**

- A. Maintain excavations until ready to install geofoam. Prevent loose soil from falling into excavation.

#### **3.03 FILLING, GENERAL**

- A. See Section 31 20 00.
- B. Fill to contours and elevations indicated using unfrozen materials.
- C. Fill up to subgrade elevations unless otherwise indicated.
- D. Employ a placement method that does not disturb or damage other work.
- E. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- F. Maintain optimum moisture content of fill materials.
- G. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- H. Correct areas that are over-excavated.
- I. Reshape and re-compact fills subjected to vehicular traffic.

**3.04 MANUFACTURED FILL INSTALLATION - GEOFOAM**

- A. Provide finish grade free of holes and protrusions.
- B. Install 8 inch leveling pad of granular, permeable material approved by Architect.
- C. Place geof foam fill as shown on drawings.
- D. Cut blocks with hot wire. Cutting with hand tools, with power tools, or by breaking block material is not permitted.
- E. Offset each layer of blocks 2 feet from adjacent rows.
- F. Rotate each layer of blocks 90 degrees in the horizontal plane relative to previous layer.
- G. Adhesive:
  - 1. Install adhesive as directed in geof foam manufacturer's written instructions.
- H. Provide temporary weighing and guying required to protect geof foam material until soil cover or pavement is in place.
- I. Avoid damage to geof foam material during other construction activities. Replace or repair damaged geof foam.

**3.05 TOLERANCES**

- A. Top Surface, Each Layer: Maximum 5/8 inch variation in any 10 foot interval.
- B. Top Surface, Areas to Receive Pavement: Zero to minus 2-3/8 inch below indicated grade.
- C. Top Surface, Slopes: Within plus or minus 3-5/8 inch of indicated grade.
- D. Vertical Joints: No gaps greater than 3/4 inch.

**3.06 CLEANING**

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Leave unused materials in a neat, compact stockpile.
- C. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**



**SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes temporary excavation support and protection systems.
- B. Related Sections:
  - 1. Section 01 50 00 "Temporary Facilities and Controls" for temporary utilities and support facilities.

1.3 REFERENCES

- A. Geotechnical Investigation: titled: **"Geotechnical Engineering Report, SJCOE Code Stack Academy, prepared by Mid Pacific Engineering, Inc., MPE No. 06357-01, prepared April 18, 2024.**
- B. Perform on-site and off-site work in accordance with these specifications, City of Stockton Standard Specifications, and Caltrans Standard Specifications.

1.4 PERFORMANCE REQUIREMENTS

- A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
  - 1. Work shall conform to the requirements of Cal-OSHA.
  - 2. Delegated Design: Design excavation support and protection system, including comprehensive engineering analysis by a California Registered Civil Engineer, using performance requirements and design criteria indicated.
  - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
  - 4. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
  - 5. Monitor vibrations, settlements, and movements.

1.5 SUBMITTALS

- A. Delegated-Design Submittal: For excavation support and protection system indicated to comply with performance requirements and design criteria, including analysis data signed and stamped by the qualified professional engineer responsible for their preparation.
- B. Qualification Data: For qualified California Registered Land Surveyor and California Registered Civil Engineer.
- C. Other Informational Submittals:

1. Photographs or Video: Show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems. Submit before Work begins.
2. Record Drawings: Identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions.
  - a. Note locations and capping depth of wells and well points.

#### 1.6 PROJECT CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
  1. Notify Owner no fewer than three days in advance of proposed interruption of utility.
  2. Do not proceed with interruption of utility without Owner's written permission.
- B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from the data.
  1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
- C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
  1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

#### PART 2 - PRODUCTS

- 2.1 None

#### PART 3 - EXECUTION

##### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
  1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  - C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.
  - D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
  - E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.
- 3.2 SOLDIER PILES AND LAGGING
- A. Install steel soldier piles before starting excavation. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
  - B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.
  - C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.
- 3.3 BRACING
- A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
    1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Architect.
    2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
    3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.
- 3.4 REMOVAL AND REPAIRS
- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.
    1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlaying construction and abandon remainder.
    2. Fill voids immediately with approved backfill compacted to density specified in Section 31 20 00 "Earth Moving."
    3. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.

**END OF SECTION 31 50 00**

## **SECTION 31 66 15 - HELICAL FOUNDATION PILES**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Helical piles used to support compression loads.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 31 20 00 – Earth Moving.

#### **1.03 DEFINITIONS**

- A. Specific terms used in this section are defined below. Terms not defined below are defined in DFI TM-GLOS-1 first and then by common usage.
- B. Extension Section: Helical foundation component installed between lead section and load transfer device.
- C. Effective Torsional Resistance: Average installation torque typically taken over a distance equal to last three diameters of penetration of largest helix plate.
- D. Geotechnical Capacity (or, Ultimate Soil Capacity): Maximum load resisted.
- E. Lead Section: First helical foundation component installed in soil.
- F. Limit State: Condition beyond which a helical foundation component is unfit for service.
  - 1. Serviceability Limit State: Foundation no longer useful for its intended function.
  - 2. Strength Limit State: Foundation is unsafe.
- G. Loads: Forces or other actions that result from weight of all building materials, occupants and their possessions, environmental effects, differential movement, and restrained dimensional changes. Permanent loads are those loads in which variations over time are rare or of small magnitude. All other loads are variable loads (see also Nominal Load below).
- H. Load Test: Procedure to test capacity and relation of load to movement.
- I. Mechanical Strength: Maximum tension load resisted by structural elements of helical foundation.
- J. Nominal Load: Magnitude of loads determined by Structural Engineer, including dead load, live load and other imposed by building code requirements
- K. Reveal: Distance along longitudinal axis from ground surface to end of last installed extension of a foundation.
- L. Safety Factor: Ratio of ultimate pullout resistance to nominal load.
- M. Ultimate Pullout Resistance: Limit state based on lesser of mechanical strength or geotechnical capacity and defined as point at which helical foundation can resist no additional load.

#### **1.04 REFERENCE STANDARDS**

- A. AISC 360 - Specification for Structural Steel Buildings; 2016.
- B. ASTM A29/A29M - Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought; 2023.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021a.

- F. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.
- G. ASTM D1143/D1143M - Standard Test Methods for Deep Foundation Elements Under Static Axial Compressive Load; 2020.
- H. DFI TM-GLOS-1 - Deep Foundation Institute Technical Manual; Glossary of Foundation Terms; 1981.
- I. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2020.
- J. SAE J429 - Mechanical and Material Requirements for Externally Threaded Fasteners; 2014.

#### 1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation meeting: Conduct a preinstallation meeting one week prior to start of work of this section; require attendance by all affected installers.

#### 1.06 SUBMITTALS

- A. Product Data: Product list, with manufacturer's model designations; published capacities for installed assemblies, including load transfer devices.
- B. Calibration Reports for Testing Equipment: Submit certified copies of calibration of torque measuring equipment and load test measuring equipment to be used on project, performed within one year of starting date of installation.
- C. Installer's Qualification Statement.
- D. Installation Logs:
  - 1. Submit a copy of the log of each individual foundation element within 24 hours after installation is completed.
  - 2. Submit final copy of all installation logs within two weeks after completing all helical foundation work.
- E. Field Test Reports.
- F. Project Record Documents: After work is complete, submit certification from surveyor that installed foundation locations are as shown on drawings.

#### 1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced in installation of helical foundations of the type involved on this project, as evidenced by:
  - 1. Manufacturer's certificate of competency in installing helical piles.
  - 2. List of three or more similar projects completed within the previous three years and names of representatives who can verify such participation.
  - 3. Letter from manufacturer stating ability and intent to provide on-site supervision.
- B. Surveyor Qualifications: Engineer or land surveyor licensed in the State in which the Project is located.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Helical Piles and Anchors:
  - 1. [Ideal](#) Manufacturing, Inc.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

#### 2.02 MATERIALS

- A. All Components: Hot-dipped galvanized in accordance with ASTM A123/A123M.
- B. Helical Anchors: Solid, square shaft of hot rolled, solid, Round-Cornered-Square (RCS), carbon steel bar complying with ASTM A29/A29M.
  - 1. Size: 1-3/4 inch square.
  - 2. Torque Strength: 8,500 foot-pounds.
  - 3. Minimum Yield Strength: 90 kips per square inch.
- C. Helical Anchors and Piles: Hollow, round shaft of structural steel tube or pipe (rolled) complying with ASTM A572/A572M.
  - 1. Size: 3-1/2 inches O.D. by 0.313 inch wall thickness.
  - 2. Torque Strength: 8,500 foot-pounds.
  - 3. Minimum Yield Strength: 65 kips per square inch.
- D. Helix Plates: Round steel plates formed into helical spiral on matching metal dies to true helical shape and uniform pitch; welded to central shaft with all plates tracking the same path as leading helix.
  - 1. Material: Hot rolled carbon steel sheet, strip, or plate complying with ASTM A36/A36M or ASTM A572/A572M, Grade 50.
  - 2. Thickness: 3/8 inch
  - 3. Profile: True helix-shaped plates, normal to shaft, leading and trailing edges within 1/4 inch of parallel.
  - 4. Pitch: 3 inches plus or minus 1/4 inch. All helix plates shall have uniform pitch.
  - 5. Edge Profile: Circular edge.
  - 6. Spacing: Between 2.4 and 3.6 times helix diameter.
- E. Bolts: SAE J429, Grade 8, bolts with nut.
- F. Couplings: Integral to shaft.
- G. Anchor Plates or Pile Caps: Load-transfer assembly welded from structural steel complying with ASTM A36/A36M.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Protect structures near the work and underground utilities from damage.
- B. Mark underground utilities as required by authority having jurisdiction. Avoid contact with all marked underground facilities.
- C. Locate the starting point of installation in relation to existing site elevation.
- D. Notify Owner at least 24 hours prior starting to installation.

#### **3.02 INSTALLATION**

- A. Install helical foundations as shown on drawings and approved design documentation. In event of conflict between drawings and approved anchorage design documentation, do not begin construction on any affected items until such conflict has been resolved.
- B. Comply with manufacturer's written installation requirements and recommendations for specific project site and conditions.
- C. Use installation methods that will not cause damage to existing adjacent or nearby structures.
- D. Keep and submit a log of helical foundation installations, including the following data:

1. Date and time of installation.
  2. Location of foundation element.
  3. Installed foundation type and configuration.
  4. Foundation reveal.
  5. Total length of installed foundation element.
  6. Installed inclination of foundation element.
  7. For compression piles, installation torque measurements taken in one to three foot increments of total length.
  8. Actual effective torsional resistance.
  9. Calculated geotechnical capacity based on actual torsional resistance and soil parameters appropriate for subsurface conditions within three helix diameters above helix depth.
  10. Comments pertaining to interruptions, obstructions, or other relevant information.
- E. If required, position inclined helical anchors perpendicular in order to assist in advancement into soil before establishing required batter angle; after initial penetration, establish required angle of inclination
- F. Engage helical sections into soil and advance in a smooth, continuous manner at a rate of rotation of 5 to 20 RPM.
- G. Apply sufficient down pressure to uniformly advance helical sections a distance per revolution approximately equal to pitch of helix plates.
- H. Adjust rate of rotation and magnitude of down pressure for specific soil conditions and depths.
- I. Provide extension sections as required to achieve required results.
- J. Achieve both minimum embedment length and minimum effective torsional resistance prior to terminating foundation installation.
- K. Location Tolerances:
1. Helical Pile Termination Bracket Horizontal Location Tolerance: Within 2 inches of location shown on drawings.
  2. Pile Shaft Angular Tolerance: Within 2 degrees of plumb.
  3. Vertical Elevation of Pile Termination Brackets: Within 1 inch of elevations specified.
  4. Employ surveyor to document actual locations of foundation elements.

### 3.03 ACHIEVEMENT OF EFFECTIVE INSTALLATIONS

- A. In the event that the initial installation of a foundation element does not achieve both minimum embedment length and minimum effective torsional resistance, adjust, repair, or replace that foundation element as described on the helical pile drawings.

### 3.04 FIELD QUALITY CONTROL

- A. A minimum of (1) sacrificial pre-production helical pile shall be pull tested to geotechnical failure as defined by an inelastic deflection of 10% of the average helix diameter (0.9"). the location of the test helical pile will be selected by the helical pile engineer in conjunction with the geotechnical engineer and the contractor. Test loads shall be applied with a hollow stem hydraulic ram and monitored with a load cell capable of measuring the applied load to a minimum accuracy of 2%. Deflections shall be measured relative to a fixed reference with a minimum accuracy of 0.01 inch. An initial alignment (seating) load of 10 kips shall be applied and the initial deflection recorded. The load shall be gradually increased monotonically until the measured deflection exceeds geotechnical failure. The measured geotechnical failure load

shall be used to calculate a site-specific value of  $K_t$ . If it is found that the site-specific  $K_t$  value is less than the design value the minimum required torque shall be increase to ensure the ultimate capacity meets the required minimum factor of safety of 2.0.

**END OF SECTION**



**SECTION 32 12 16 - ASPHALT PAVING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Hot-mix asphalt patching.
- 2. Hot-mix asphalt paving.

B. Related Requirements:

- 1. Section 31 20 00 "Earth Moving" for subgrade preparation, fill material, and unbound-aggregate subbase and base courses.
- 2. Section 32 17 23 "Pavement Markings" for application of pavement markings on asphalt concrete paving.

1.3 SUBMITTALS

A. Product Data: For each type of product.

- 1. Include technical data and tested physical and performance properties.
- 2. Job-Mix Designs: For each job mix proposed for the Work.

B. Qualification Data: For manufacturer.

C. Material Certificates: For each paving material. Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.

D. Material Test Reports: For each paving material, by a qualified testing agency.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by CalTrans.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the San Joaquin County and CalTrans for asphalt paving work.

- 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Prime Coat: Minimum surface temperature of 60 deg F.
2. Tack Coat: Minimum surface temperature of 60 deg F.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
5. Single Course (3 inch minimum): Minimum surface temperature of 50 deg F and rising with a minimum atmospheric temperature of 45 deg F and rising at time of placement.

## PART 2 - PRODUCTS

### 2.1 AGGREGATES

#### A. In accordance with CalTrans Section 39:

1. Single or Top Layer: 1/2 inch maximum, medium, Type A.
2. Lower Layer: 3/4 inch maximum, coarse, Type A.
3. Reclaimed asphalt pavement (RAP) may be used as aggregate for a part of the virgin aggregate in the asphalt paving in a quantity not exceeding 15 percent of the aggregate blend.

### 2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320, PG 64-10.
- B. Asphalt Cement: ASTM D 3381/D 3381M for viscosity-graded material.
- C. Cutback Prime Coat: ASTM D 2027, medium-curing cutback asphalt, MC-250.
- D. Tack Coat: AASHTO M 140 emulsified asphalt, or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- E. Water: Potable.
- F. Undersealing Asphalt: ASTM D 3141; pumping consistency.

### 2.3 AUXILIARY MATERIALS

- A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement and reclaimed, unbound-aggregate base material from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.
- B. Herbicide: Commercial chemical for weed control, registered by the California EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.
- C. Sand: AASHTO M 29, Grade No. 2 or No. 3.
- D. Joint Sealant: AASHTO M 324, Type I, hot-applied, single-component, polymer-modified bituminous sealant.

### 2.4 MIXES

- A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that compacted subgrade is dry and in suitable condition to begin paving.
- B. Verify that compacted subgrade is ready to support paving and imposed loads.
- C. Verify that gradients and elevations of base are correct.
- D. Proceed with paving only after unsatisfactory conditions have been corrected.

#### 3.2 PATCHING

- A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Re-compact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.150.10 gal./sq. yd..
  1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Placing Patch Material: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

#### 3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
  1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.
  2. Coordinate treatment application with District personnel. Provide District a minimum of 72 hour advance notice before application.

- C. Cutback Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd.. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
  - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
  - 2. Protect primed substrate from damage until ready to receive paving.

### 3.4 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
  - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated on approved drawings.
  - 2. Place hot-mix asphalt surface course in single lift.
  - 3. Spread mix at a minimum temperature of 250 deg F.
  - 4. Begin applying mix on high side of one-way slopes unless otherwise indicated.
  - 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
  - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
  - 2. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
  - 1. Clean contact surfaces and apply tack coat to joints.
  - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
  - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
  - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

**3.6 COMPACTION**

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
  - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
  - 1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

**3.7 INSTALLATION TOLERANCES**

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Single Course or Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course: 1/4 inch.
  - 2. Single Course or Surface Course: 1/8 inch.

**3.8 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures according to AASHTO T 168.
  - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
  - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
    - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores taken.
    - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

**END OF SECTION 32 12 16**

**SECTION 32 13 13 - CONCRETE PAVING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Curbs and gutters.
- 2. Walks.

B. Related Sections:

- 1. Section 03 30 00 "Cast-in-Place Concrete for general building applications of concrete.
- 2. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and adjacent construction.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- D. Qualification Data: For installer and Design Mixture Engineer (California Registered Civil or Structural Engineer).
- E. Material Certificates: Certificates shall be signed by manufacturers and contractor certifying that each material complies with, or exceeds specified requirements for the following:
  - 1. Cementitious materials.
  - 2. Aggregates.
  - 3. Steel reinforcement and reinforcement accessories.
  - 4. Admixtures.
  - 5. Curing compounds.
  - 6. Applied finish materials.
  - 7. Joint fillers.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified.
  - 1. California Building Code - Title 24, Part 2, CCR-2022 Edition with State of California Amendments.
  - 2. ACI 301 "Specifications for Structural Concrete for Buildings." A registered civil engineer with experience in concrete mix design shall select the relative amounts of ingredients to be used as basic proportions of the concrete mixes proposed for use under CBC Section 1905A.2 and testing shall be performed in a laboratory acceptable to the enforcement agency.
  - 3. ACI 318 "Building Code Requirements for Reinforced Concrete."
  - 4. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
- B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- C. Concrete Testing Service: The Owner shall employ a testing laboratory acceptable to the Architect to perform material evaluation tests. Design of concrete mixes shall be by a registered civil engineer retained by the Contractor.
  - 1. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at Owner's expense, including re-testing of rejected materials and installed work, shall be paid by Owner, but backcharged to the Contractor.
  - 2. Testing shall be performed per Section 3.10 of these Specifications and Chapter 19, Title 24

1.6 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

**PART 2 - PRODUCTS**

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
  - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.



- B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- C. Reinforcing Bars: ASTM A 615, Grade 60 for #4 and larger, and ASTM A615, Grade 40 for #3 and smaller ; deformed.
- D. Plain-Steel Wire: ASTM A 82, cold drawn.
- E. Deformed-Steel Wire: ASTM A 496.
- F. Joint Dowel Bars: ASTM A 615, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- G. Slip Dowel System: Greenstreak two component Speed Dowel System to accept #4 x 12" to 24" long slip dowels (see drawings for size at specific details.) The Greenstreak Speed Dowel System is comprised of a reusable base and a plastic sleeve. Both pieces shall be manufactured from polypropylene plastic.
- H. Tie Bars: ASTM A 615, Grade 60 for #4 and larger, and ASTM A615, Grade 40 for #3 and smaller, deformed.
- I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
  - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

## 2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
  - 1. Portland Cement: ASTM C 150, gray portland cement Type II
- B. Normal-Weight Aggregates and Exposed Aggregate: ASTM C 33, Class 1N, uniformly graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C 94.

## 2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

## 2.5 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.
- B. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

## 2.6 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, as specified in ACI 301 and Chapter 5 of ACI 318.
  - 1. Use a qualified independent testing agency, acceptable to Architect, for preparing and reporting proposed mixture designs based on laboratory trial mixtures. The testing shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.
  - 2. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.
- B. Adjustment to Concrete Mixes: Mix design adjustment may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and approved by Architect before using in work.
- C. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 2500 psi.
  - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.60.
  - 3. Slump Limit: 4 inches, plus or minus 1 inch.
  - 4. Air Content: Plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

## 2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. Delete references for allowing additional water to be added to batch for material with sufficient slump. Addition of water to the batch will not be permitted.
  - 2. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
  - 3. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify that compacted subgrade, granular base is dry and in suitable condition to begin paving.
- B. Verify that compacted subgrade, granular base is ready to support paving and imposed loads.
- C. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

**3.3 EDGE FORMS AND SCREED CONSTRUCTION**

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Assemble formwork to permit easy stripping and dismantling of without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.
- D. Clean forms and adjacent surface to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- E. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

**3.4 STEEL REINFORCEMENT**

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints, score lines, and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
  2. Slip Doweled Joints (Speed Dowel System): Install dowel bars and support assemblies at joints where indicated.
    - a. Attach Speed Dowel System bases to the face of the concrete forms using a double headed nail or self-tapping screw.
    - b. Center of Speed Dowel System base shall be centered on form. Place edge forms plumb. Out of plumb forms will result in misaligned dowels.
    - c. Prior to pouring concrete, Speed Dowel System sleeve shall be slipped over Speed Dowel System base.
    - d. Pour concrete minimum of 18" from Speed Dowel System and work concrete around the Speed Dowel System. Concrete shall not be poured directly over the Speed Dowel System.
    - e. Concrete forms shall be removed with Speed Dowel System bases still attached. Speed Dowel System bases may be reused.
    - f. Install slip dowels to the full depth of the embedded Speed Dowel System sleeve and proceed with next concrete pour. Greasing of dowels is not required as the embedded Speed Dowel System sleeve accommodates expansion and shrinkage movements that may occur. Bent or badly sheared slip dowels shall not be used. Saw cut dowels recommended.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of no more than 30 feet unless otherwise indicated.
  2. Extend joint fillers full width and depth of joint.
  3. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
  4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  5. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Control Joints: Form weakened-plane control joints, alternating with score lines and sectioning the concrete into areas as indicated. Construct weakened-plane joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes.

- E. Score Lines: Form score lines, alternating with weakened-plane joints and sectioning the concrete into areas as indicated. Construct score lines for a depth as indicated, as follows:
  - 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes.
- F. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove ice or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
  - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete temperature within the temperature range required by ACI 301.
  - 2. Do not use frozen materials or materials containing ice or snow.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

- K. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - 1. Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface to provide a uniform, fine-line texture.
    - a. Curbs and Gutters.
  - 2. Medium-Textured Broom Finish: Draw a stiff-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, medium-line texture.
    - a. Sidewalk Paving: Slopes less than 6%.
    - b. Gutters in Path of Travel: Slopes less than 6%.
  - 3. Heavy-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
    - a. Sidewalk Paving: Slopes of 6% or greater.
    - b. Gutters in Path of Travel: Slopes of 6% or greater.

### 3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
  - a. Water.
  - b. Continuous water-fog spray.
  - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

### 3.9 TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Weakened-plane Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

### 3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

**END OF SECTION 32 13 13**

**SECTION 32 13 73 - CONCRETE PAVING JOINT SEALANTS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Cold-applied joint sealants.
- 2. Joint-sealant backer materials.
- 3. Primers.

B. Related Requirements:

- 1. Section 07 92 00 "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Installation Instructions: Manufacturer's written installation instructions for products and applications indicated for each joint-sealant product.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Paving-Joint-Sealant Schedule: Include the following information:

- 1. Joint-sealant application, joint location, and designation.
- 2. Joint-sealant manufacturer and product name.
- 3. Joint-sealant formulation.
- 4. Joint-sealant color.

E. Qualification Data: For Installer.

F. Product Certificates: For each type of joint sealant and accessory.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.5 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:



1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS, GENERAL**

- A. **Compatibility:** Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

### **2.2 COLD-APPLIED JOINT SEALANTS**

- A. **Single-Component, Self-Leveling, Silicone Joint Sealant:** ASTM D 5893/D 5893M, Type SL.

### **2.3 JOINT-SEALANT BACKER MATERIALS**

- A. **Joint-Sealant Backer Materials:** Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. **Round Backer Rods for Cold-Applied Joint Sealants:** ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- C. **Backer Strips for Cold- and Hot-Applied Joint Sealants:** ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

### **2.4 PRIMERS**

- A. **Primers:** Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. **Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.**
- B. **Proceed with installation only after unsatisfactory conditions have been corrected.**

### **3.2 PREPARATION**

- A. **Surface Cleaning of Joints:** Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  1. Do not leave gaps between ends of joint-sealant backings.
  2. Do not stretch, twist, puncture, or tear joint-sealant backings.
  3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
  1. Place joint sealants so they fully contact joint substrates.
  2. Completely fill recesses in each joint configuration.
  3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

### 3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

### 3.5 PAVING-JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Joints within concrete paving (**PJS-1**).
  1. Joint Location:

- a. Expansion and isolation joints in concrete paving.
  - b. Contraction joints in concrete paving.
  - c. Other joints as indicated.
2. Joint Sealant: Single-component, self-leveling, silicone joint sealant.
  3. Joint-Sealant Color: Manufacturer's standard.

**END OF SECTION 32 13 73**

**SECTION 32 17 23 - PAVEMENT MARKINGS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes painted markings applied to asphalt pavement.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include technical data and tested physical and performance properties.
- B. Shop Drawings: For pavement markings.
  - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
  - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design Product:** Subject to compliance with requirements, provide Ennis-Flint; **EF Series Fast Dry** or a comparable product by one of the following:
  - 1. Aexcel Inc.
  - 2. PPG Industries.
  - 3. Rodda Paint Co.

2.2 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.
  - 1. Colors: White, Red, and Blue as indicated on the drawings.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

**3.2 PAVEMENT MARKING**

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for a minimum of 14 days before starting pavement marking. Place an inconspicuous test stripe to determine if new asphalt surface has cured sufficiently to allow placement of pavement markings. If the asphalt lifts or cracks during the curing of the test paint film, the asphalt has not cured sufficiently to allow placement of the pavement markings.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
  - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.

**3.3 PROTECTING AND CLEANING**

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

**END OF SECTION 32 17 23**

**SECTION 32 17 26 - TACTILE WARNING SURFACING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

**A. Section Includes:**

- 1. Cast-in-place detectable warning tiles.
- 2. Surface-applied detectable warning tiles.

**B. Related Requirements:**

- 1. Section 32 12 16 "Asphalt Paving" for asphalt paving serving as substrates for tactile warning surfacing.
- 2. Section 32 13 13 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.

**1.3 SUBMITTALS**

**A. Product Data:** For each type of product.

**B. Samples for Initial Selection:** For each type of exposed finish requiring color selection.

**C. Samples for Verification:** For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

**1.4 CLOSEOUT SUBMITTALS**

**A. Maintenance Data:** For tactile warning surfacing, to include in maintenance manuals.

**1.5 PROJECT CONDITIONS**

**A. Cold-Weather Protection:** Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

**B. Weather Limitations for Adhesive Application:**

- 1. Apply adhesive only when ambient temperature is above 50 deg F and when temperature has not been below 35 deg F for 12 hours immediately before application. Do not apply when substrate is wet or contains excess moisture.

**C. Weather Limitations for Mortar and Grout:**

- 1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.
  - a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set unit pavers within 1 minute of spreading setting-bed mortar.

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering and wear.
    - b. Separation or delamination of materials and components.
  2. Warranty Period: Five years from date of Substantial Completion.

#### PART 2 - PRODUCTS

##### 2.1 TACTILE WARNING SURFACING, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in Chapter 11B of the 2019 California Building Code for tactile warning surfaces.
  1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.
- B. Source Limitations: Obtain each type of tactile warning surfacing, joint material, setting material, anchor, and fastener from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

##### 2.2 DETECTABLE WARNING TILES

- A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide Engineered Plastics Inc.; Armor-Tile; (Drawings Mark) See Detail **ADA-C**.
  2. Material: Vitrified polymer composite
  3. Color: Federal Yellow (Federal Color No. 33538)
  4. Shapes and Sizes:
    - a. Rectangular panels as indicated on approved drawings.
  5. Dome Spacing and Configuration: 2.35-inch spacing, in square pattern.
  6. Mounting:
    - a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.

## 2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:
  - 1. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.
- B. Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to pavement.
- C. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF TACTILE WARNING SURFACING

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of Chapter 11B of the 2022 California Building Code.

### 3.3 INSTALLATION OF DETECTABLE WARNING TILES

- A. Cast-in-Place Detectable Warning Tiles:
  - 1. Concrete Paving Installation: Comply with installation requirements in Section 32 13 13 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of tile.
  - 2. Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedments in wet concrete by tamping with rubber mallet until concrete seeps through vent holes.
  - 3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding  $\pm 1/8$  inch from flush.
  - 4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
  - 5. Clean tiles using methods recommended in writing by manufacturer.
- B. Surface-Applied Detectable Warning Tiles:
  - 1. Lay out detectable warning tiles as indicated and mark concrete pavement.
  - 2. Prepare existing paving surface by grinding and cleaning as recommended by manufacturer.



3. Apply adhesive to back of tiles in amounts and pattern recommended by manufacturer, and set tiles in place. Firmly seat tiles in adhesive bed, eliminating air pockets and establishing full adhesion to pavement. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
4. Install anchor devices through face of tiles and into pavement using anchors located as recommended by manufacturer. Set heads of anchors flush with top surface of mat.
5. Mask perimeter of tiles and adjacent concrete, and apply sealant in continuous bead around perimeter of tile installation.
6. Remove masking, adhesive, excess sealant, and soil from exposed surfaces of detectable warning tiles and surrounding concrete pavement using cleaning agents recommended in writing by manufacturer.
7. Protect installed tiles from traffic until adhesive has set.

**3.4 CLEANING AND PROTECTION**

- A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.
- B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

**END OF SECTION 32 17 26**

**SECTION 32 31 19 - DECORATIVE METAL FENCES AND GATES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Decorative steel fences.
- B. Decorative aluminum fences.
- C. Automatic gate operators.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 08 71 00 – Finish Hardware for Pedestrian Gate Hardware

**1.03 REFERENCE STANDARDS**

- A. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2024.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- E. ASTM D523 - Standard Test Method for Specular Gloss; 2014 (Reapproved 2018).
- F. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints; 2002 (Reapproved 2017).
- G. ASTM D822/D822M - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings; 2013 (Reapproved 2018).
- H. ASTM D1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008, with Editorial Revision (2017).
- I. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates; 2023.
- J. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact); 1993 (Reapproved 2024).
- K. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test; 2023.
- L. ASTM F2200 - Standard Specification for Automated Vehicular Gate Construction; 2020.
- M. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets; 2016 (Reapproved 2023).
- N. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- O. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- P. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- Q. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- R. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to start of work of this section; require attendance by affected installers.

### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings:
  - 1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
- D. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines.
- E. Manufacturer's Warranty.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Tools: One each of every special tool required for maintenance of fences, gates, gate hardware, and gate operators.

### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Experienced with type of construction involved and materials and techniques specified and approved by fence manufacturer.

### **1.07 DELIVERY, STORAGE AND HANDLING**

- A. Store materials in a manner to ensure proper ventilation and drainage. Protect against damage, weather, vandalism and theft.

### **1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five-year period after Date of Substantial Completion.
- C. Provide 20-year manufacturer warranty for decorative steel and aluminum fences.
- D. Provide a 5-year manufacturer warranty for automatic gate operators.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Decorative Metal Fences and Gates:
  - 1. Alumi-Guard; Commercial Flat Top, Ascot 2 Rail: [www.alumi-guard.com](http://www.alumi-guard.com)
  - 2. Ameristar Perimeter Security, USA; Montage II, Genesis: [www.ameristarperimeter.com](http://www.ameristarperimeter.com)
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Automatic Gate Operators:
  - 1. LiftMaster; CSL24UL: [www.liftmaster.com](http://www.liftmaster.com)

2. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.02 FENCES**

- A. Fences: Complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; finished with electrodeposition coating, and having the following performance characteristics:
- B. Electro-Deposition Coating: Multistage pretreatment/wash with zinc phosphate, followed by epoxy primer and acrylic topcoat.
  1. Total Coating Thickness: 2 mils, minimum.
  2. Color: As selected by Architect from manufacturer's standard range.
  3. Coating Performance: Comply with general requirements of ASTM F2408.
    - a. Adhesion: ASTM D3359 (Method B); Class 3B with 90 percent or more of coating remaining in tested area.
    - b. Corrosion Resistance: ASTM B117, ASTM D714 and ASTM D1654; 1/8 inch coating loss or medium No.8 blisters after 1,500 hours.
    - c. Impact Resistance: ASTM D2794; 60 inch pounds.
    - d. Weathering Resistance: ASTM D523, ASTM D822/D822M and ASTM D2244; less than 60 percent loss of gloss.
- C. Steel: ASTM A653/A653M; tensile strength 45,000 psi, minimum.
  1. Hot-dip galvanized; ASTM A653/A653M, G60.
  2. 62 percent recycled steel, minimum.
- D. Aluminum: ASTM B221.
  1. Tubular Pickets, Rails and Posts: 6005-T5 alloy.
  2. Extrusions for Posts and Rails (Outer Channel): 6005-T5 alloy.
  3. Extrusions for Pickets and Rail (Inner Slide Channels): 6063-T5 alloy.
- E. Fasteners: ASTM A276/A276M, Type 302 stainless steel; finished to match fence components.
  1. Tamper-proof security bolts.

## **2.03 WELDED STEEL FENCE**

- A. Provide fence meeting requirements for Industrial class as defined by ASTM F2408.
- B. Fence Panels: Fusion welded; 7 feet high by 8 feet long.
  1. Panel Style: Two rail.
  2. Attach panels to posts with manufacturer's standard panel brackets.
- C. Posts: Steel tube.
- D. Rails: Manufacturer's standard, double-wall steel channel 1-3/4-inch square by 12-gauge, 0.1094 inch with prepunched picket holes.
- E. Pickets: Steel tube.
  1. Spacing: 3-3/4 inch clear.
  2. Size: 1 inch square by 14-gauge, 0.0747 inch.
  3. Style: Square top pickets extend above top rail.
- F. Flexibility: Capable of following variable slope of up to 1:2.

## 2.04 ALUMINUM FENCE

- A. Decorative Aluminum Fence System:
1. Fence Panels: 7 feet high by 8 feet long.
    - a. Attach panels to posts with manufacturer's standard panel brackets and recommended fasteners.
    - b. Posts: Manufacturer's standard; extruded aluminum tubes.
    - c. Rails: Manufacturer's standard; extruded aluminum channels.
    - d. Pickets: Manufacturer's standard; extruded aluminum tubes.
      - 1) Style: Flat top – two rail.
    - e. Fasteners: Manufacturer's standard stainless-steel bolts, screws, and washers; factory finish fasteners to match fence.
    - f. Accessories: Aluminum castings, extrusions and cold-formed strips; factory finished to match fence.
    - g. Color: As selected by Architect from manufacturer's standard range.
    - h. Products:
      - 1) Alumi-Guard, Commercial, Flat Top, Ascot 2 Rail.
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
- B. Decorative Aluminum Telescopic Gates:
1. Gate Panels: Match appearance of Steel or Aluminum Gate Panels.
  2. Opening size: 26'-0"
  3. Size: Each Leaf: 14'-4" (2 required per vehicle opening).
  4. Weight (Max.): 750 lbs. per leaf.
  5. Posts: Aluminum extrusions; 2 inches square.
  6. Rails and Frame: Welded aluminum extrusions; 2 inches by 3 inches.
  7. Hardware:
    - a. Telescoping Gate System: Comunello, LLC; Ranger Kit RG2-120-50 for 2 leaf sliding gate. [www.gatedepot.com/comunello-ranger-telescoping-sliding-gate-system](http://www.gatedepot.com/comunello-ranger-telescoping-sliding-gate-system)
    - b. Provide parts and accessories for a complete system.
  8. Operation: Automatic.
    - a. Operator: Comply with UL 325, Class I and ASTM F2200.
    - b. Manufacturer's standard electric operating system with integral controls, sensors, remote latching and unlatching, safety devices, communication devices, and emergency vehicle access.
    - c. Provide a separate clearly marked pedestrian access for each entrance with automated gate.
  9. Color: As selected by Architect from manufacturer's standard range.

## 2.05 SPECIALITY HARDWARE

- A. Hinges: Finished to match fence components.
1. Closing: Self

2. Mechanism: Hydraulic
3. Material: Steel.
4. Mounting: External.
5. Brackets: Square.
6. Bearings: Ball.
7. Color: Black.
8. Products:
  - a. Locinox; Mammoth – Heavy Duty 180° Hydraulic Gate Closer and Hinge.
  - b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Latches: See 08 71 00 – Finish Hardware

## **2.06 AUTOMATIC GATE OPERATORS**

- A. Sliding Gates: Prewired, pedestal-mounted gate operator for horizontal sliding gates, per ASTM F2200 and UL 325.
  1. Class: Class I.
  2. Operating type: Gear driven with roller chain.
  3. Control Functions: Open, Pause, Close.
  4. Traveling Speed: 12 inches per second.
  5. Access: Internet connectivity, remote control, and key/toggle switch (fire department access via KnoxBox)
  6. Maximum gate weight: 1,500 pounds (560 kilograms).
  7. Horsepower Rating: Suitable for connected load.
  8. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
    - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
    - b. Secondary Device: Provide electric sensing edge with wireless edge kit or monitored safety edge as an option along with continuous-constant control device.
  9. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
    - a. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      - 1) Outdoor Locations: Type 3R.
    - b. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
  10. Accessories:
    - a. Internet gateway
    - b. Commercial access control receiver

### **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 Architect of unsatisfactory preparation before proceeding.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Set fence posts in accordance with the manufacturer recommended spacing.
- C. When cutting rails immediately seal the exposed surfaces by:
  - 1. Removing metal shavings from cut area.
  - 2. Apply zinc-rich primer to thoroughly cover cut edge and drilled hole; allow to dry.
  - 3. Apply two coats of custom finish spray paint matching fence color.
  - 4. Failure to seal exposed surfaces in accordance with manufacturer's instructions will negate manufacturer's warranty.
- D. Space gate posts according to the manufacturers' drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected.
  - 1. Base type and quantity of gate hinges on the application, weight, height, and number of gate cycles.
- E. Install operator in accordance with manufacturer's instructions and in accordance with NFPA 70.

#### **3.03 TOLERANCES**

- A. Maximum Variation from Plumb: 1/4 inch.
- B. Maximum Offset from Indicated Position: 1 inch.
- C. Minimum Distance from Property Line: 6 inches.

#### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.
- C. Post Settings: Randomly inspect three locations against design for:
  - 1. Hole diameter.
  - 2. Hole depth.
  - 3. Hole spacing.
- D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.
- E. Gates: Inspect for level, plumb, and alignment.
- F. Workmanship: Verify neat installation free of defects.

#### **3.05 CLEANING**

- A. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.
- B. Clean fence with mild household detergent and clean water rinse well.

- C. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

**3.06 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate operation of system to Owner's personnel.
  - 1. Use operation and maintenance data as reference during demonstration.
  - 2. Briefly describe function, operation, and maintenance of each component.
- D. Training: Train Owner's personnel on operation and maintenance of system.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
  - 2. Provide minimum of two hours of training.

**3.07 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

**END OF SECTION**



**SECTION 32 33 13 - SITE BICYCLE RACKS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior bicycle racks.

**1.02 RELATED REQUIREMENTS**

- A. Section 32 13 13 – Concrete Paving: Mounting surface for bicycle racks.
- B. Section 32 33 14 - Site Bicycle Lockers.

**1.03 REFERENCE STANDARDS**

- A. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Handle racks with sufficient care to prevent scratches and other damage to the finish.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Exterior Bicycle Racks:
  - 1. MADRAX, a brand of Graber Manufacturing, Inc; Orion, ORN – Round Tube: [www.madrax.com](http://www.madrax.com)
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 BICYCLE RACKS**

- A. Exterior Bicycle Racks: Device allows user-provided lock to simultaneously secure one wheel and part of the frame on each bicycle parked or racked.
  - 1. Style: Round loop.
  - 2. Capacity: Two bicycles.
  - 3. Mounting, Ground: Surface flange.
  - 4. Finish: Powder coat, maintenance-free and weather-resistant.
  - 5. Color: Patriot Blue.

- B. Materials:
  - 1. Tube: Carbon steel, ASTM A500/A500M.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Examine surfaces to receive bicycle racks.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.
- C. Do not begin installation until unsatisfactory conditions are corrected.

**3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install level, plumb, square, and correctly located as indicated on drawings.
- C. Surface Flange Installation: Anchor bicycle racks securely in place with stainless steel expansion anchors indicated in the drawings with one expansion anchor through each flange hole.

**3.03 CLEANING**

- A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

**3.04 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

**SECTION 32 33 14 - SITE BICYCLE LOCKERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior bicycle lockers.

**1.02 RELATED REQUIREMENTS**

- A. Section 32 13 13 - Concrete Paving: Mounting surface for bicycle lockers.
- B. Section 32 33 13 - Site Bicycle Racks.

**1.03 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Handle lockers with sufficient care to prevent scratches and other damage to the finish.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Exterior Bicycle Lockers:
  - 1. MADRAX, a brand of Graber Manufacturing, Inc; Narrow Madlocker; MLN-1; ML-Padlock; MLN-PDB: [www.madrax.com/#sle](http://www.madrax.com/#sle).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 BICYCLE LOCKERS**

- A. Exterior Steel Bicycle Lockers: Secure storage enclosure fabricated of steel panels with factory applied finish and factory installed hardware.
  - 1. Style: Narrow Madlocker without a floor.
  - 2. Capacity: One bicycle per unit.
  - 3. Layout: Horizontal.
  - 4. Panels: Steel sheet, 16 gauge, 0.0598 inch minimum thickness, with manufacturer's standard perforations.
  - 5. Door and Frame: Steel sheet; 12-gauge, 0.1046-inch minimum thickness, door factory hung and adjusted.

6. Hardware:
    - a. Door Hinges: Full length, piano type hinges of 15 gauge, 0.0673 inch minimum thickness, stainless steel.
    - b. Locking Mechanism: Steel vertical locking bar running full length of door.
    - c. Lock Hardware: Manufacturer's standard stainless steel pistol grip style handle with "U" style lock and padlock adapter.
  7. Mounting, Ground: Flanges suitable for post-installed anchors..
  8. Finish: Powder coat, factory applied over primer.
  9. Color: Patriot Blue.
- B. Materials:
1. Bar, Round and Flat, Carbon Steel: ASTM A36/A36M.
  2. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine surfaces to receive bicycle lockers.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Do not begin installation until unsatisfactory substrates have been properly repaired.

#### **3.02 PREPARATION**

- A. Ensure surfaces to receive bicycle lockers are clean, flat, and level.

#### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install bicycle lockers level, plumb, square, and correctly located as indicated on drawings.

#### **3.04 CLEANING**

- A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

#### **3.05 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

**SECTION 33 05 00 - COMMON WORK RESULTS FOR UTILITIES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Piping joining materials.
  - 2. Transition fittings.
  - 3. Dielectric fittings.
  - 4. Sleeves.
  - 5. Identification devices.
  - 6. Grout.
  - 7. Flowable fill.
  - 8. Piped utility demolition.
  - 9. Piping system common requirements.
  - 10. Equipment installation common requirements.
  - 11. Painting.
  - 12. Concrete bases.
  - 13. Metal supports and anchorages.

1.3 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- C. ABS: Acrylonitrile-butadiene-styrene plastic.
- D. PE: Polyethylene plastic.
- E. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Dielectric fittings.
  - 2. Identification devices.
- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.
- C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
  - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

## 2.2 TRANSITION FITTINGS

- A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- B. Transition Couplings NPS 1-1/2 and Smaller:
  - 1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
  - 2. Aboveground Piping: Specified piping system fitting.
- C. AWWA Transition Couplings NPS 2 and Larger:
  - 1. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.
- D. Plastic-to-Metal Transition Fittings:
  - 1. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint or threaded end.
- E. Plastic-to-Metal Transition Unions:
  - 1. Description: MSS SP-107, PVC four-part union. Include brass or stainless-steel threaded end, solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.
- F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:
  - 1. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

## 2.3 DIELECTRIC FITTINGS

- A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
  - 1. Description: Factory fabricated, union, NPS 2 and smaller.
    - a. Pressure Rating: 150 psig minimum at 180 deg F.
    - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.
- C. Dielectric Flanges:

1. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 and larger.
  - a. Pressure Rating: 150 psig minimum.
  - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:

1. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 and larger.
  - a. Pressure Rating: 150 psig minimum.
  - b. Gasket: Neoprene or phenolic.
  - c. Bolt Sleeves: Phenolic or polyethylene.
  - d. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:

1. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 and smaller.
  - a. Pressure Rating: 300 psig at 225 deg F.
  - b. End Connections: Threaded.

F. Dielectric Nipples:

1. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.
  - a. Pressure Rating: 300 psig at 225 deg F.
  - b. End Connections: Threaded or grooved.

## 2.4 SLEEVES

- A. Mechanical sleeve seals for pipe penetrations are specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- B. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.
- D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

## 2.5 IDENTIFICATION DEVICES

- A. General: Products specified are for applications referenced in other utilities Sections. If more than single type is specified for listed applications, selection is Installer's option.
- B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.



1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
  2. Location: Accessible and visible.
- C. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.
- D. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.
- E. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.
- F. Lettering: Manufacturer's standard preprinted captions as selected by Architect.
1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.
- G. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.
1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
  2. Color: Comply with ASME A13.1, unless otherwise indicated.
- H. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
1. Material: 0.032-inch- thick, polished brass.
  2. Size: 1-1/2 inches in diameter, unless otherwise indicated.
  3. Shape: As indicated for each piping system.
- I. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.
- J. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
  2. Thickness: 1/8 inch, unless otherwise indicated.
  3. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
  4. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.
- K. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:
1. Green: Cooling equipment and components.
  2. Yellow: Heating equipment and components.
  3. Brown: Energy reclamation equipment and components.
  4. Blue: Equipment and components that do not meet criteria above.
  5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
  6. Terminology: Match schedules as closely as possible. Include the following:

- a. Name and plan number.
  - b. Equipment service.
  - c. Design capacity.
  - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
7. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
- L. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.
1. Size: 3-1/4 by 5-5/8 inches.
  2. Fasteners: Brass grommets and wire.
  3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
- M. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.
1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

## 2.6 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  2. Design Mix: 5000-psi, 28-day compressive strength.
  3. Packaging: Premixed and factory packaged.

## 2.7 FLOWABLE FILL

- A. Description: Low-strength-concrete, flowable-slurry mix.
1. Cement: ASTM C 150, Type I, portland.
  2. Density: 115- to 145-lb/cu. ft.
  3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse.
  4. Water: Comply with ASTM C 94.
  5. Strength: 100 to 200 psig at 28 days.

## PART 3 - EXECUTION

### 3.1 DIELECTRIC FITTING APPLICATIONS

- A. Dry Piping Systems: Connect piping of dissimilar metals with the following:
1. NPS 2 and Smaller: Dielectric unions.
  2. NPS 2-1/2 to NPS 12: Dielectric flanges or dielectric flange kits.
- B. Wet Piping Systems: Connect piping of dissimilar metals with the following:

1. NPS 2 and Smaller: Dielectric couplings.
2. NPS 2-1/2 to NPS 4: Dielectric nipples.
3. NPS 2-1/2 to NPS 8: Dielectric nipples or dielectric flange kits.
4. NPS 10 and NPS 12: Dielectric flange kits.

### 3.2 PIPING INSTALLATION

- A. Install piping according to the following requirements and utilities Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
  1. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas 2 inches above finished floor level.
  2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
    - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
    - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
- J. Verify final equipment locations for roughing-in.
- K. Refer to equipment specifications in other Sections for roughing-in requirements.

### 3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.
- I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

### 3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Install dielectric fittings at connections of dissimilar metal pipes.

### 3.5 EQUIPMENT INSTALLATION

- A. Install equipment level and plumb, unless otherwise indicated.
- B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
- C. Install equipment to allow right of way to piping systems installed at required slope.

3.6 PAINTING

- A. Painting of piped utility systems, equipment, and components is specified in Section 09 91 00 "Painting and Finishing." Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 IDENTIFICATION

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
  - 1. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
  - 2. Locate pipe markers on exposed piping according to the following:
    - a. Near each valve and control device.
    - b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
    - c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
    - d. At manholes and similar access points that permit view of concealed piping.
    - e. Near major equipment items and other points of origination and termination.
- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.
  - 1. Lettering Size: Minimum 1/4 inch high for name of unit if viewing distance is less than 24 inches, 1/2 inch high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
  - 2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.8 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
  - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
  - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of base.
  - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
  - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
  - 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 "Cast-in-Place Concrete"

**3.9 ERECTION OF METAL SUPPORTS AND ANCHORAGES**

- A. Refer to Section 05 50 00 "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

**3.10 GROUTING**

- A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

**END OF SECTION 33 05 00**

**SECTION 33 11 00 - FACILITY WATER DISTRIBUTION PIPING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

1.3 DEFINITIONS

- A. LLDPE: Linear, low-density polyethylene plastic.
- B. PE: Polyethylene plastic.
- C. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
- C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
  - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
  - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

- D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
  - 1. Flush immediately prior to connecting to fire sprinkler systems.
- F. NSF Compliance:
  - 1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
  - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
  - 1. Ensure that valves are dry and internally protected against rust and corrosion.
  - 2. Protect valves against damage to threaded ends and flange faces.
  - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
  - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
  - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

#### 1.7 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
  - 1. Notify Architect and Owner no fewer than three business days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of water-distribution service without Owner's written permission.



1.8 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K, water tube, annealed temper.
  - 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
- B. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- C. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.2 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Flanges: ASME 16.1, Class 125, cast iron.

2.3 PVC PIPE AND FITTINGS

- A. PVC, Schedule 80 Pipe: ASTM D 1785.
  - 1. PVC, Schedule 80 Socket Fittings: ASTM D 2467.
  - 2. PVC, Schedule 80 Threaded Fittings: ASTM D 2464.
- B. PVC, AWWA Pipe: AWWA C900, Class 150 and Class 200, with bell end with gasket, and with spigot end.
  - 1. Comply with UL 1285 for fire-service mains if indicated.
  - 2. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 JOINING MATERIALS

- A. Refer to Section 33 05 00 "Common Work Results for Utilities" for commonly used joining materials.
- B. Brazing Filler Metals: AWS A5.8, BCuP Series.

- C. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

## 2.5 CORROSION-PROTECTION PIPING ENCASEMENT

- A. Encasement for Underground Metal Piping:
  - 1. Standards: ASTM A 674 or AWWA C105.
  - 2. Form: Sheet or tube.
  - 3. Material: LLDPE film of 0.008-inch minimum thickness, or high-density, crosslaminated PE film of 0.004-inch minimum thickness.
  - 4. Color: Black.

## 2.6 GATE VALVES

- A. AWWA, Cast-Iron Gate Valves:
  - 1. Non-rising-Stem, Metal-Seated Gate Valves:
    - a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.
      - 1) Standard: AWWA C500.
      - 2) Minimum Pressure Rating: 200 psig.
      - 3) End Connections: Mechanical joint.
      - 4) Interior Coating: Complying with AWWA C550.
- B. UL/FMG, Cast-Iron Gate Valves:
  - 1. UL/FMG, Non-rising-Stem Gate Valves:
    - a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.
      - 1) Standards: UL 262 and FMG approved.
      - 2) Minimum Pressure Rating: 175 psig.
      - 3) End Connections: Flanged.
- C. Bronze Gate Valves:
  - 1. Non-rising-Stem Gate Valves:
    - a. Description: Class 125, Type 1, bronze with solid wedge, threaded ends, and malleable-iron handwheel.
      - 1) Standard: MSS SP-80.

## 2.7 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Tapping-Sleeve Assemblies:
  - 1. Description: Sleeve and valve compatible with drilling machine.
    - a. Standard: MSS SP-60.

- b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
  - c. Valve: AWWA, cast-iron, non-rising-stem, metal-seated gate valve with one raised face flange mating tapping-sleeve flange.
- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
- 1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
- C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

## 2.8 WATER METERS

- A. Water meters will be furnished by utility company.

## 2.9 BACKFLOW PREVENTERS

- A. Reduced-Pressure-Principle Backflow Preventers:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide FEBCO; Model #LF860 or a comparable product by one of the following:
  - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
  - b. Conbraco Industries, Inc.
  - c. Watts Water Technologies, Inc.
  - d. Wilkins; a Zurn company.
- 2. Standard: ASSE 1013.
- 3. Operation: Continuous-pressure applications.
- 4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
- 5. Size: NPS 2.
- 6. Design Flow Rate: 72 gpm.
- 7. Selected Unit Flow Range Limits: 0-180 gpm.
- 8. Pressure Loss at Design Flow Rate: 11 psig for NPS 2 and smaller.
- 9. Body: Bronze for NPS 2 and smaller.
- 10. End Connections: Threaded for NPS 2 (DN 50) and smaller.
- 11. Configuration: Designed for horizontal, straight through flow.
- 12. Accessories:
  - a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller.
  - b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.

- B. Double-Check, Detector-Assembly Backflow Preventers:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide FEBCO; Model #LF856 or a comparable product by one of the following:
  - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
  - b. Conbraco Industries, Inc.
  - c. Watts Water Technologies, Inc.

- d. Wilkins; a Zurn company.
2. Standards: ASSE 1048 and UL listed or FMG approved as an assembly for fire protection sprinkler systems.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 5.5 psig maximum, through middle 1/3 of flow range.
5. Size: NPS 6
6. Selected Unit Flow Range Limits: 0-2000 gpm.
7. Pressure Loss at Design Flow Rate: 5.5 psi.
8. Body: Cast iron with interior lining complying with AWWA C550 or that is FDA approved.
9. End Connections: Flanged.
10. Configuration: Designed for horizontal, straight through flow.
11. Accessories:
  - a. Valves: UL 262, FMG-approved, OS&Y gate type with flanged ends on inlet and outlet.

C. Backflow Preventer Test Kits:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Conbraco Industries, Inc.
  - b. FEBCO; SPX Valves & Controls.
  - c. Flomatic Corporation.
  - d. Watts Water Technologies, Inc.
  - e. Wilkins; a Zurn company.
2. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.10 DETECTOR CHECK VALVES

A. Detector Check Valves for Automatic Fire Sprinkler Systems:

1. Basis-of-Design Product: Subject to compliance with requirements, provide FEBCO; Series LF856 or a comparable product by one of the following:
  - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
  - b. Badger Meter, Inc.
  - c. Victaulic Company of America.
  - d. Viking Corporation.
  - e. Watts Water Technologies, Inc.
  - f. Wilkins; Zurn Industries LLC.
2. Description: Detector check shall consist of a single spring-loaded swing check in parallel with a bypass meter assembly. Seat rings shall be bronze, bolted to the valve bodies with an elastomer seal. The main check assembly shall be hinge guided. Head loss through the assembly shall not exceed 3 psi at velocities from zero up to and including 15fps. Mainline check body and cover shall be manufactured of Ductile Iron ASTM A536 Grade 6545-12. Ductile Iron bodies shall be flanged ANSI B16.42, Class 150 and fusion epoxy coated 8 mils minimum to meet A.W.W.A. C550-90. Disc shall be rubber encapsulated ductile iron. Set valve to allow minimal water flow through bypass meter when major water flow is required.

- a. Standards: UL 312 and FMG approved.
- b. Pressure Rating: 175 psig (maximum).
- c. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.

## 2.11 FIRE HYDRANTS

### A. Dry-Barrel Fire Hydrants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Cast Iron Pipe Co.; American Flow Control Div.: American Darling Model B-84-B
  - b. American Cast Iron Pipe Co.; Waterous Co. Subsidiary; Pacer WB-87.
  - c. Mueller Co.; Water Products Div.: Model #A423 traffic type.
2. Description: Freestanding, with one NPS 4 and two NPS 2-1/2 outlets, 5-1/4-inch main valve, drain valve, and NPS 6 mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.
  - a. Standard: AWWA C502.
  - b. Pressure Rating: 250 psig.
  - c. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
  - d. Operating and Cap Nuts: Pentagon, 1-1/2 inches point to flat.
  - e. Direction of Opening: Open hydrant valve by turning operating nut to left or counterclockwise.
  - f. Exterior Finish: Safety Yellow alkyd-gloss enamel paint, unless otherwise indicated.

## 2.12 FIRE DEPARTMENT CONNECTIONS

### A. Fire Department Connections:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Elkhart Brass Mfg. Co., Inc.
  - b. Fire End & Croker Corporation.
  - c. Guardian Fire Equipment, Inc.
  - d. Kidde Fire Fighting.
  - e. Potter Roemer.
  - f. Reliable Automatic Sprinkler Co., Inc.
2. Description: Exposed, with cast-bronze or cast-brass body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded inline outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet.
  - a. Standard: UL 405.
  - b. Connections: Two NPS 2-1/2 inlets and one NPS 4 outlet.
  - c. Inlet Alignment: Inline, horizontal.
  - d. Finish: Cast-bronze or cast-brass.

- e. Body Marking: "AUTO SPKR & STANDPIPE."

## 2.13 ALARM DEVICES

- A. Alarm Devices, General: UL 753 and FMG approved, of types and sizes to mate and match piping and equipment.
- B. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.

## 2.14 PROTECTIVE ENCLOSURES

- A. Expanded-Metal Enclosures:
  - 1. Description: Enclosure designed to protect aboveground water piping, equipment, or specialties from damage.
    - a. Material: ASTM F 1267, expanded metal side and top panels, of weight and with reinforcement of same metal at edges as required for rigidity.
    - b. Type: Type II, expanded and flattened.
    - c. Class: Class 2, hot-dip, zinc-coated carbon steel.
    - d. Finish: Manufacturer's enamel paint.
    - e. Size: Of dimensions indicated, but not less than those required for access and service of protected unit.
    - f. Locking device.
    - g. Lugs or devices for securing enclosure to base.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Refer to Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling.

### 3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping NPS 3/4 to NPS 3 shall be the following:
  - 1. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented joints.
- F. Underground water-service piping NPS 4 to NPS 8 shall be the following:
  - 1. NPS 4 and NPS 6: NPS 6 PVC, AWWA Class 150 pipe; PVC, AWWA Class 150 mechanical-joint, ductile-iron fittings; and gasketed joints.

2. NPS 8: PVC, AWWA Class 200 pipe; mechanical-joint, ductile-iron fittings; and gasketed joints.

G. Aboveground Water-Service Piping NPS 3/4 to NPS 3 shall be the following:

1. Hard copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.

H. Vault Water-Service Piping NPS 3/4 to NPS 3 shall be the following:

1. PVC, Schedule 80 pipe; PVC, Schedule 80 threaded fittings; and threaded joints.

I. Aboveground water-service piping NPS 4 to NPS 8 shall be the following:

1. Ductile-iron, grooved-end pipe; ductile-iron, grooved-end appurtenances; and grooved joints.

J. Vault water-service piping NPS 4 to NPS 8 shall be any of the following:

1. Ductile-iron, grooved-end pipe; ductile-iron, grooved-end appurtenances; and grooved joints.
2. PVC, Schedule 80 pipe; PVC, Schedule 80 threaded fittings; and threaded joints.

K. Underground Fire-Service-Main Piping NPS 4 to NPS 12 shall be the following:

1. PVC, AWWA Class 200 pipe listed for fire-protection service; PVC Class 200 fabricated fittings; and gasketed joints.

L. Aboveground Fire-Service-Main Piping NPS 4 to NPS 12 shall be ductile-iron, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.

### 3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, non-rising-stem gate valves for installation with indicator posts.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, non-rising-stem, metal-seated gate valves with valve box.
2. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FMG, cast-iron, non-rising-stem gate valves with indicator post.
3. Use the following for valves in vaults and aboveground:
  - a. Gate Valves, NPS 2 and Smaller: Bronze, non-rising stem.
  - b. Gate Valves, NPS 3 and Larger: AWWA, cast iron, OS&Y rising stem, metal seated.

### 3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Section 33 05 00 "Common Work Results for Utilities" for piping-system common requirements.

### 3.5 PIPING INSTALLATION

- A. Make connections larger than NPS 2 with tapping machine according to the following:
  - 1. Install tapping sleeve and tapping valve according to MSS SP-60.
  - 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
  - 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
  - 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- B. Comply with NFPA 24 for fire-service-main piping materials and installation.
  - 1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- C. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
  - 1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- D. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- E. Bury piping with depth of cover over top at least 30 inches and according to the following:
  - 1. Under Driveways: With at least 36 inches cover over top.
- F. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- G. Extend water-service piping and connect to water-supply source and building-water-piping systems at 5 feet outside face of building wall in locations and pipe sizes indicated.
  - 1. Terminate water-service piping to 5 feet of building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- H. Sleeves are specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."
- I. Mechanical sleeve seals are specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."
- J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- K. See Section 21 13 00 "Fire Suppression Sprinklers" for fire-suppression-water piping inside the building.
- L. See Section 22 10 05 "Plumbing Piping" for potable-water piping inside the building.

### 3.6 JOINT CONSTRUCTION

- A. See Section 33 05 00 "Common Work Results for Utilities" for basic piping joint construction.
- B. Make pipe joints according to the following:



1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
3. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

### 3.7 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
  1. Concrete thrust blocks.
  2. Locking mechanical joints.
  3. Set-screw mechanical retainer glands.
  4. Bolted flanged joints.
  5. Heat-fused joints.
  6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
  1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
  2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
  3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
  4. Fire-Service-Main Piping: According to NFPA 24.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

### 3.8 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- D. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.
- E. MSS Valves: Install as component of connected piping system.

### 3.9 ROUGHING-IN FOR WATER METERS

- A. Rough-in piping and specialties for water meter installation according to utility company's written instructions.

### 3.10 DETECTOR-CHECK VALVE INSTALLATION

- A. Install in vault or aboveground.
- B. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.

- C. Support detector check valves, meters, shutoff valves, and piping on concrete piers.

### 3.11 PROTECTIVE ENCLOSURE INSTALLATION

- A. Install concrete base level and with top approximately 2 inches above grade.
- B. Install protective enclosure over valves and equipment.
- C. Anchor protective enclosure to concrete base.

### 3.12 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
  - 1. Provide physical damage protection (bollards) where applicable, retaining a 3'-0" clearance (minimum) around fire hydrants and other equipment. Pipe bollards are specified in Section 05 50 00 "Metal Fabrications."
- B. AWWA Fire Hydrants: Comply with AWWA M17.
- C. UL/FMG Fire Hydrants: Comply with NFPA 24.

### 3.13 FIRE DEPARTMENT CONNECTION INSTALLATION

- A. Install at detector check assembly as indicated on drawings.
- B. Install protective pipe bollards on two sides of each fire department connection (when required and shown on drawings). Pipe bollards are specified in Section 05 50 00 "Metal Fabrications."

### 3.14 ALARM DEVICE INSTALLATION

- A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
- B. Supervisory Switches: Supervise valves in open position.
  - 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
- C. Locking and Sealing: Secure unsupervised valves as follows:
  - 1. Valves: Install chain and padlock on open OS&Y gate valve.
- D. Connect alarm devices to building fire alarm system. Wiring and fire-alarm devices are specified in Section 28 31 00 "Fire Alarm Integrated Safety System."

### 3.15 CONNECTIONS

- A. See Section 33 05 00 "Common Work Results for Utilities" for piping connections to valves and equipment.
- B. Connect water-distribution piping to utility water main. Use tapping sleeve and tapping valve.
- C. Connect water-distribution piping to interior domestic water and fire-suppression piping.

- D. Ground equipment according to Section 26 05 00 "Basic Materials and Methods."

### 3.16 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test per 2022 California Plumbing Code Section 609.4 "Testing."
  - 1. Remake leaking joints with new materials and repeat test until leak free.
- C. Prepare reports of testing activities.

### 3.17 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 31 20 00 "Earth Moving."
- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Section 33 05 00 "Common Work Results for Utilities" for identifying devices.

### 3.18 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
  - 1. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
    - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
    - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

**END OF SECTION 33 11 00**

## **SECTION 33 31 00 - FACILITY SANITARY SEWERS**

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Pipe and fittings.
  - 2. Non-pressure couplings.
  - 3. Pressure-type pipe couplings.
  - 4. Cleanouts.
  - 4. Manholes.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- C. Field quality-control reports.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.

#### 1.5 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect and Owner no fewer than three days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of service without Owner's written permission.

### PART 2 - PRODUCTS

#### 2.1 PVC PIPE AND FITTINGS

- A. PVC Type PSM Sewer Piping:
  - 1. Pipe: ASTM D 3034, SDR 26, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
  - 2. Fittings: ASTM D 3034, PVC with bell ends.

3. Gaskets: ASTM F 477, elastomeric seals.

B. PVC Pressure Piping:

1. Pipe: AWWA C900, Class 200 PVC pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: AWWA C900, Class 200 PVC pipe with bell ends.
3. Gaskets: ASTM F477, elastomeric seals.

## 2.2 NON-PRESSURE-TYPE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground non-pressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, Flexible Couplings:

1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

F. Non-pressure-Type, Rigid Couplings:

1. Description: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling, molded from ASTM C 1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.

## 2.3 PRESSURE-TYPE PIPE COUPLINGS

- A. Tubular-Sleeve Couplings: AWWA C219, with center sleeve, gaskets, end rings, and bolt fasteners.

- B. Metal, bolted, sleeve-type, reducing or transition coupling; for joining underground pressure piping. Include 200-psig minimum pressure rating and ends of same sizes as piping to be joined.

- C. Center-Sleeve Material: Manufacturer's standard.

- D. Gasket Material: Natural or synthetic rubber.

- E. Metal Component Finish: Corrosion-resistant coating or material.

## 2.4 CLEANOUTS

### A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Light Duty, Medium Duty, Heavy Duty, and Extra-Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

### B. PVC Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

## 2.5 MANHOLES

### A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: Class "B" concrete base with 8 inch minimum thickness below pipe and with top of base at 3 inches minimum above top of pipe and at least 1 foot larger than outside diameter of manhole.
5. Riser Sections: 5-inch minimum thickness, of length to provide depth indicated.
6. Top Section: Concentric-cone; with top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Grade Rings: Reinforced-concrete rings, 6- to 12-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

## 2.6 CONCRETE

### A. General: Cast-in-place concrete complying with ACI 318, ACI 350, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

### B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

### C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

### PART 3 - EXECUTION

#### 3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

#### 3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- D. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- E. Install gravity-flow, non-pressure, drainage piping according to the following:
  1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
  2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
  3. Install piping with 30-inch minimum cover.
  4. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
- F. Install force-main, pressure piping according to the following:
  1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
  2. Install piping with 30-inch minimum cover.
  3. Install PVC pressure piping according to AWWA M23 or to ASTM D2774 and ASTM F1668.
- G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

#### 3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, non-pressure, drainage piping according to the following:

1. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
2. Join dissimilar pipe materials with non-pressure-type, flexible or rigid couplings.

B. Join force-main, pressure piping according to the following:

1. Join PVC pressure piping according to AWWA M23 for gasketed joints.
2. Join dissimilar pipe materials with pressure-type couplings.

### 3.4 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Form continuous concrete channels and benches between inlets and outlet.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements.
- E. Install manhole-cover inserts in frame and immediately below cover.

### 3.5 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

### 3.6 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in sewer pipe.
  1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
  2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
  3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

### 3.7 CONNECTIONS

- A. Connect non-pressure, gravity-flow drainage piping to building's sanitary building drains specified in Section 22 05 00 "General Plumbing Systems."
- B. Make connections to existing piping and underground manholes.
  1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.



3. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

### 3.8 CLOSING ABANDONED SANITARY SEWER SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed.
  1. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Backfill to grade according to Section 31 20 00 "Earth Moving."

### 3.9 IDENTIFICATION

- A. Comply with requirements in Section 31 20 00 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
  1. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

### 3.10 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
  1. Submit separate report for each system inspection.
  2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects. Contractor shall perform either the Hydrostatic Test or the Air Test on the pipes.
  1. Do not enclose, cover, or put into service before inspection and approval.
  2. Test completed piping systems according to requirements of authorities having jurisdiction.
  3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  4. Submit separate report for each test.
  5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

- a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
  - b. Close openings in system and fill with water.
  - c. Purge air and refill with water.
  - d. Disconnect water supply.
  - e. Test and inspect joints for leaks.
6. Air Tests: Test sanitary sewerage according to requirements of UNI-B-6.
  7. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig.
    - a. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
  8. Manholes: Perform hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
  - D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- 3.11 CLEANING
- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

**END OF SECTION 33 31 00**

**SECTION 33 41 00 - STORM UTILITY DRAINAGE PIPING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Pipe and fittings.
  - 2. Non-pressure transition couplings.
  - 3. Pressure pipe couplings.
  - 4. Cleanouts.
  - 5. Drains.
  - 6. Catch basins.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
  - 1. Storm water system. Include plans, elevations, sections, details, frames, covers, and grates.
- C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between catch basins, piping, and proximate structures.
- D. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle catch basins according to manufacturer's written rigging instructions.

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect and Owner no fewer than twothree days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of service without Owner's written permission.

## PART 2 - PRODUCTS

### 2.1 PVC PIPE AND FITTINGS

#### A. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

#### B. PVC Pressure Piping:

1. Pipe: AWWA C900, Class 200 PVC pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: AWWA C900, Class 200 PVC pipe with bell ends
3. Gaskets: ASTM F 477, elastomeric seals.

### 2.2 NONPRESSURE TRANSITION COUPLINGS

#### A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground non-pressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

#### B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

#### C. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

### 2.3 PRESSURE PIPE COUPLINGS

#### A. Description: AWWA C219, tubular-sleeve coupling, with center sleeve, gaskets, end rings, and bolt fasteners.

#### B. Metal, bolted, sleeve-type, reducing or transition coupling, for joining underground pressure piping. Include 200-psig minimum pressure rating and ends sized to fit adjoining pipes.

#### C. Center-Sleeve Material: Manufacturer's standard.

#### D. Gasket Material: Natural or synthetic rubber.

#### E. Metal Component Finish: Corrosion-resistant coating or material.

### 2.4 CLEANOUTS

#### A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Light Duty, Medium Duty, Heavy Duty, and Extra-Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. Plastic Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.5 DRAINS

A. Cast-Iron Area Drains:

1. Description: ASME A112.6.3 gray-iron round body with anchor flange and round grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
2. Top-Loading Classification(s): Medium and Heavy Duty.
3. Grates shall have 1/2 inch max. opening per 2010 CBC path of travel requirements.

2.6 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.7 CATCH BASINS

A. Standard Precast Concrete Catch Basins:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Riser Sections: 4-inch minimum thickness, 12-inch square, and lengths to provide depth indicated.
3. Top Section: 4-inch minimum thickness, 12-inch square, and lengths to provide depth indicated.
4. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

- B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.
  - 1. Size: 15 by 15 inches with 1/2 inch max. opening per 2010 CBC path of travel requirements.
  - 2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

### PART 3 - EXECUTION

#### 3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

#### 3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, non-pressure drainage piping according to the following:
  - 1. Install piping pitched down in direction of flow.
  - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  - 3. Install piping with 36-inch minimum cover.
  - 4. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
- G. Install force-main pressure piping according to the following:
  - 1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  - 2. Install piping with 36-inch minimum cover.
  - 3. Install PVC pressure piping according to AWWA M23, or ASTM D 2774 and ASTM F 1668.

#### 3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, non-pressure drainage piping according to the following:

1. Join ABS sewer piping according to ASTM D 2321 and ASTM D 2751 for elastomeric-seal joints.
2. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
3. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
4. Join dissimilar pipe materials with non-pressure-type flexible couplings.

B. Join force-main pressure piping according to the following:

1. Join PVC pressure piping according to AWWA M23 for gasketed joints.
2. Join dissimilar pipe materials with pressure-type couplings.

### 3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from drainage pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in drainage pipe.

1. Use Medium-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 24 by 24 by 6 inches deep. Set with tops 1 inch above surrounding earth grade.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

### 3.5 DRAIN INSTALLATION

A. Install type of drains in locations indicated.

1. Use Medium-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification drains in vehicle-traffic service areas.

B. Embed drains in 4-inch minimum concrete around bottom and sides.

C. Fasten grates to drains if indicated.

D. Set drain frames and covers with tops flush with pavement surface.

### 3.6 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

### 3.7 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

### 3.8 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 22 05 00 "General Plumbing Systems."
- B. Connect force-main piping to building's storm drainage force mains specified in Section 22 05 00 "General Plumbing Systems." Terminate piping where indicated.
- C. Make connections to existing piping and underground manholes.
  - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
    - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
    - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
  - 4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- D. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
  - 1. Use non-pressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
    - a. Shielded flexible couplings for same or minor difference OD pipes.
    - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
  - 2. Use pressure-type pipe couplings for force-main joints.

### 3.9 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
  - 1. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.



- B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
  - 1. Remove manhole or structure and close open ends of remaining piping.
  - 2. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

- C. Backfill to grade according to Section 31 20 00 "Earth Moving."

### 3.10 IDENTIFICATION

- A. Materials and their installation are specified in Section 31 20 00 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
  - 1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

### 3.11 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
  - 1. Submit separate reports for each system inspection.
  - 2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  - 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
  - 1. Do not enclose, cover, or put into service before inspection and approval.
  - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
  - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  - 4. Submit separate report for each test.
  - 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
    - b. Option: Test plastic piping according to ASTM F 1417.
    - c. Option: Test concrete piping according to ASTM C 924.

6. Force-Main Storm Drainage Piping: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig.

a. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.12 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with water.

**END OF SECTION 33 41 00**