

SPECIFICATIONS



County of San Benito
RESOURCE MANAGEMENT AGENCY

HOMELESS SHLTER – PHASE III

PROJECT #PWB- 2001

SITE WORK PACKAGE SUBMITTAL
FEBRUARY 19, 2020

APPROVED AS TO LEGAL FORM:
San Benito County Counsel's Office

Barbara Thompson,
County Counsel

Date _____

APPROVED:
San Benito County Board of Supervisors

Jaime De La Cruz,
Chair

Date _____

PROJECT MANAGER

DAMON FELICE, LEED AP
COUNTY OF SAN BENITO

2301 TECHNOLOGY PKWY.
HOLLISTER, CA 95023
T 831.636.4170
F 831.636.4176



PROJECT MANUAL

For

**San Benito County
Homeless Shelter Phase III**

1161 San Felipe Road
Hollister, CA 95023

Date: February 19, 2020

In Studio
250 Main Street
Hollister, CA 95023
Tel: (831) 320-2655

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A copy of the Prevailing Wage Scale is available at the following web site:
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COUNTY OF SAN BENITO RESOURCE MANAGEMENT AGENCY



2301 Technology Parkway • Hollister, CA 95023-3840
831.636.4170 • 831.636.4176 fax • www.cosb.us

NOTICE TO CONTRACTORS

San Benito County Homeless Services Center – Phase III

PROJECT: PWB-2001

Sealed Bids shall be delivered to the San Benito County Resource Management Agency, 2301 Technology Parkway, Hollister, California, 95023-3840, no later than **2:00 P.M. on Wednesday, March 18, 2020**. Bids will be opened and will be publicly read in the **RMA conference room, 2301 Technology Parkway, Hollister, California at 2:00 P.M.** or thereafter. This project is for licensed **contractors with a Type B license**. The Contractor shall complete all or any designated portions of the work called for under the contract in all parts and requirements within 150 calendar days (except as modified in the technical specifications). The County of San Benito and its Board of Supervisors reserves the right to reject any or all Bids received as the public good may require.

There will be two mandatory pre-bid meetings, only one of which needs to be attended by prospective bidders. The meeting(s) will take place at 1161 San Felipe Road, Hollister, CA 95023, both will start at 11AM. The first meeting will take place on **February 27, 2020** and the second will take place on **March 4, 2020**.

Each contractor shall include in their Bid all labor, tools, and materials for a complete and working project for each trade component in conformance with the intent shown on the plans and specifications and specified herein.

Plans, Specifications and Bid forms to be used for bidding on this project can only be obtained by going to the San Benito County website at www.cosb.us. On the right-hand side, under Quicklinks, you will see "Bids & RFPs". Click on this link, and go down the page until you see "Listing of Advertised Projects". Click on this link and it will take you to E-Bid Board, where you will find the project name. Click on the name to see the IFB, plans and specs for this job. If you have any questions, please call the San Benito County Resource Management Agency, Public Works Division at (831) 636-4170.

Prospective Bidders must be fully qualified, licensed, certified, and insured to perform the work requested. All work performed must meet all current applicable laws and regulations.

Each Bidder must submit a Bid for the project for which they intend to bid to the Administrative Office on the standard forms enclosed. Said Bid shall be accompanied by a cashier's check, a certified check or Bidder's bond of ten percent (10%) of the amount of the Bid submitted, to be made payable to the County of San Benito. Bid bonds shall be issued by a corporate surety duly admitted and authorized to issue bonds and undertakings by the State of California.

Pursuant to Section 1700, and following, of the California Labor Code, the Contractor shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Copies of such prevailing rate of per diem wages are available at the following web site: http://www.dir.ca.gov/DLSR/statistics_research.html#PWD. Those copies shall be made available to any interested party upon request. The Contractor shall forfeit, as penalty, to the County of San

Benito, twenty-five dollars (\$25.00) for each calendar day or portion thereof, for each workman paid less than the stipulated prevailing rates for any work done under the contract by it or by any subcontractor under it, in violation of the provisions of such Labor Code.

County will be the sole judge as to the technical acceptability of any Bids and any award will be as determined most advantageous to the County considering such factors as completeness and responsiveness to this Invitation for Bids, experience, references, and anticipated costs. The County reserves the right to reject any or all Bids or parts thereof and to waive any informality or irregularity in any Bid or the bidding process.

Insurance requirements for the project shall be the amounts set forth in the General Conditions, Section 19, unless expressly modified below:

Commercial General Liability Insurance	\$ _____
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All Risk Property Coverage or Builders Risk Insurance	\$ _____
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Business Automobile Liability Insurance	\$ _____
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PROJECT DIRECTORY

OWNER:	SAN BENITO COUNTY 1131 San Felipe Rd Hollister, CA 95023 Phone: (831) 902-2207 Contact: Damon Felice
ARCHITECTS:	IN STUDIO ARCHITECTURE 250 Main Street Salinas, CA 93901 Phone: (831) 320-2655 Contact: Alex Reynoso
STRUCTURAL:	DONALD C. URFER AND ASSOC. INC. 2715 Porter Street Soquel, CA 95073 Phone: (831) 476-3681 Contact: Karen Wiinikka
MECHANICAL:	AXIOM ENGINEERS 22 Lower Ragsdale Drive, Suite A Monterey, CA 93940 Phone: (831) 649-8000 Contact: Bill Estes
ELECTRICAL/ COMMUNICATIONS:	AURUM CONSULTING ENGINEERS 60 Garden Court, Suite 210 Monterey, CA 93940 Phone: (916) 256-2460 Contact: Eldridge Bell

INSTRUCTIONS TO BIDDERS

1) All portions of the Bid must be completed before the Bid is submitted. Failure to do so may result in the Bid being rejected as nonresponsive. Attached to and submitted with this Bid, Bidder must provide: (1) the Bid Schedule; (2) Names and Titles Form; (3) Bidder's Bond; (4) Reference List; (5) Subcontractor List; (6) Noncollusion Affidavit, completed and signed by Bidder; (7) Statement of Compliance, completed and signed by Bidder; (8) Bidder's Qualifications, completed and signed by Bidder; (9) Guaranty, completed and signed by Bidder; (10) Contractor's Certificate as to Worker's Compensation, completed and signed by Bidder; and, (11) Affidavit Concerning Employment of Undocumented Aliens, completed and signed by Bidder. Failure to submit all required documents may result in the Bid being rejected as nonresponsive.

2) An original of the Bid form shall be filled in and submitted as the Bid.

3) County of San Benito has obtained report(s) that may contain facts that may materially effect Bidders' Bids. County of San Benito has constructed other public works projects throughout the County of San Benito, and obtained reports and other information in the course of the design and construction of those other public works construction projects, all of which may contain facts that may materially effect Bidders' Bids. Bidders are strongly encouraged to inspect applicable County of San Benito reports, records and documents. Said reports and documents will be made available upon written request at the Administrative Office, 481 Fourth Street, Hollister, California, 95023 for inspection and copying at Bidders' sole cost and expense, during normal working hours, Monday through Friday, 9:00 a.m. through 5:00 p.m..

4) If a pre-bid conference has been scheduled at the site of the work, all Bidders, subcontractors, material suppliers, and others who may be working on the work of improvement are strongly encouraged to attend this pre-bid conference. Due to the facts and circumstances of this particular project, the on-site pre-bid conference may be the only opportunity to conduct the pre-bid investigation of the site and satisfy the pre-bid obligations set forth in these Contract Documents. If a Bidder (or others) attend the entirety of a scheduled pre-bid on-site conference and need additional time to complete their investigation of the site or other pre-bid obligations set forth in these Contract Documents, Bidder must notify the County of San Benito in writing, via certified or registered mail, within three (3) days of the on-site pre-bid conference, to request additional time to complete its investigation of the site. The written request must include an estimate of the amount of additional time required by Bidder at the site. County of San Benito retains discretion to determine additional time requirements, if any.

5) Investigations of subsurface conditions or otherwise, are made for the purpose of design, and the County of San Benito assumes no responsibility whatsoever with respect to the sufficiency or accuracy of borings, the log of test borings, or other preliminary investigations, or of the interpretation thereof, and there is no guaranty, either expressed or implied, that the conditions indicated are representative of those existing throughout the work, or any part of it, or that unanticipated conditions may not occur. When a log of test borings or other report is made available to Contractor or included in the Contract Documents, it is expressly understood and agreed that said log of test borings or other reports does not constitute a part of the Contract, and represents only an opinion of the County of San Benito as to the character of the materials to be encountered, and is made available or included in the Contract Documents only for the convenience of the Bidders. Bidders must satisfy themselves, through their own investigation, as to conditions to be encountered.

6) In addition to other minimum qualifications, the County of San Benito has determined that the successful lowest responsive, responsible Bidder must demonstrate to the satisfaction of the County of San Benito, the following minimum experience to be qualified to perform the work described in the Contract Documents:

a. Have possessed a valid, active and in good standing, State of California Department of Consumer Affairs, Contractor's License Board license, appropriate for trade being bid, for a minimum of five (5) continuous years prior to the date of Bid opening.

b. Not have any pending disciplinary proceedings or investigations by the Contractor's State License Board.

c. Currently (as of the date of Bid opening) or within the past year, not have any suspensions, disbarments, or similar proceedings (including stipulated agreements), restricting, limiting or prohibiting Bidder from bidding or performing other public works projects for any other public agency.

7) Following the opening of Bids, the County of San Benito may request in writing that the apparent lowest responsive, responsible Bidder complete a Contractor Qualifications Questionnaire and furnish all required supporting documentation to enable the County of San Benito to determine whether the apparent lowest responsive, responsible Bidder is qualified to perform the work described in the Contract Documents. By submission of a Bid, Bidder agrees to complete the Contractor Qualifications Questionnaire, furnish all required attachments, sign the Contractor Qualifications Questionnaire, all in strict conformance with the requirements of the Contract Documents and Contractor Qualifications Questionnaire, and return to the County of San Benito within ten (10) days of County of San Benito's written request. If Bidder fails or refuses to complete the Contractor Qualifications Questionnaire, furnish all required attachments, sign the Contractor Qualifications Questionnaire, or return it to the County of San Benito within ten (10) days of date of dispatch of County of San Benito's written request, Bidder may not be considered for award of the contract, and further, Bidder agrees that the County of San Benito may either award the work to another Bidder or call for new Bids. In such event, the Bidder shall be liable to the County of San Benito for the difference between the amount of the disqualified Bid and the larger amount for which the County of San Benito procures the work plus all of the County of San Benito's costs, damages, expenses, and liabilities.

8) If for any reason the County of San Benito elects to not award the contract to the apparent lowest responsive, responsible Bidder, the County of San Benito may request in writing that the apparent second lowest responsive, responsible Bidder complete the Contractor Qualifications Questionnaire and furnish all required supporting documentation to enable the County of San Benito to determine whether the second lowest responsive, responsible Bidder is qualified to perform the work described in the Contract Documents. If for any reason the County of San Benito elects to not award the contract to the apparent second lowest responsive, responsible Bidder, the County of San Benito may request the third lowest responsive, responsible Bidder complete the Contractor Qualifications Questionnaire and furnish all required supporting documentation, and so on.

9) If the County of San Benito receives from a Bidder within the time set forth in these Contract Documents, a complete Contractor Qualifications Questionnaire and all required supporting documentation as required by the Contract Documents, and if the County of San Benito determines that a Bidder is not qualified to perform the work required by the Contract Documents, and if the County of San Benito elects to not award the Contract to that Bidder, the County of San Benito will promptly return that Bidder's Bid security.

10) Bid protests shall be filed in writing with the County Administrative Officer, County of San Benito, Administrative Office, 481 Fourth Street, Hollister, California, 95023, by certified or registered mail, not later than three (3) days after the Bid opening or, if the protest is based on the selection of the apparent lowest responsive responsible Bidder, not later than three (3) days after selection of the apparent lowest responsive, responsible Bidder. The protest shall specify the reasons and facts upon which the protest is based.

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GENERAL CONDITIONS

1) BASIC DEFINITIONS:

A. The term "Change Order" shall refer to a written agreement in the form included in these Contract Documents, signed by the County, Owner's Representative, Construction Manager, and Contractor, modifying the Contract.

B. The term "Claim" (see Paragraph 39).

C. The term "Construction Change Directive" (C.C.D.) shall refer to a written directive, signed by County, directing Contractor to perform and/or omit certain work as specified within the Construction Change Directive. The Contractor shall promptly comply with the Construction Change Directive and promptly perform and/or omit the work specified in the Construction Change Directive.

D. The term "Contract" means the Contract Documents.

E. The term "Contract Documents" consists of all documents listed in Paragraph 2, Contract Documents, of these General Conditions.

F. The term "Contract Sum" means the total compensation specified in the Contract. The Contract Sum may be adjusted by Change Order.

G. The term "Contract Time" means the number of days set forth in the Bid within which the full completion of the Contractor's work must be achieved. The Contract Time may be adjusted by Change Order.

H. The term "Contractor" means the person or firm identified as such in the Contract, or its authorized representative.

I. The term "County" means the County of San Benito, its trustees, officers, and employees.

J. The term "Owner's Representative" means the County of San Benito, its officers, employees, and designees. The County may, at any time, without prior notice to or approval by Contractor, replace Owner's Representative with a new Owner's Representative. Upon Contractor's receipt of notice from County of such replacement, Contractor shall recognize such person or firm as Owner's Representative for all purposes under the Contract Documents.

K. The term "Project" means the total of the work and obligations agreed to be performed by Contractor under the Contract.

L. The term "day" means a calendar day unless otherwise specifically noted.

M. The term "Architect" means the design professional that prepared the Contract Documents and serves as an authorized representative. The Architect will assist the County with administration of the Contract.

2) **CONTRACT DOCUMENTS:** The Contract Documents consist of the Notice to Contractors; Instructions to Bidders; Bid; Bidder's Bond; Names and Titles Form; Noncollusion Affidavit; Statement of Compliance; Designation of Subcontractors; Bidder's Qualifications; Guaranty; Contractor's Certificate as to Worker's Compensation; Affidavit Concerning Employment of Undocumented Aliens; Contract; General Conditions; **Plans dated August 15, 2020 and Specifications dated February 19, 2020**; any addenda issued; Change Orders; and any other documents described as such within these Contract Documents.

3) **EXAMINATION OF CONTRACT DOCUMENTS AND SITE OF WORK:** Each Bidder shall examine carefully the site of the work and the Contract Documents, and shall satisfy itself as to the character, quality, and quantity of the surface and subsurface materials or obstacles to be encountered.

The submission of a Bid shall be conclusive evidence that the Contractor has satisfied itself through Contractor's own investigation as to the conditions to be encountered; the character, quality, and scope of work to be performed; the materials and equipment to be furnished; and all requirements of the Contract Documents.

Where investigations of subsurface conditions have been made with respect to foundation or other structural design, and that information is made available to Contractor or shown in the Contract Documents, said information represents only the statement as to the character of materials which have been actually encountered by it in its investigation, and is only made available or included for the convenience of Bidders.

Investigations of subsurface conditions are made for the purpose of design, and the County assumes no responsibility whatsoever with respect to the sufficiency or accuracy of borings, the log of test borings, or other preliminary investigations, or of the interpretation thereof, and there is no guaranty, either expressed or implied, that the conditions indicated are representative of those existing throughout the work, or any part of it, or that unanticipated conditions may not occur. When a log of test borings is made available to Contractor or included in the Contract Documents, it is expressly understood and agreed that said log of test borings does not constitute a part of the Contract, and represents only an opinion of the County as to the character of the materials to be encountered, and is made available or included in the Contract Documents only for the convenience of the Bidders. Making such information available to Bidders is not to be construed in any way as a waiver of the provisions of the first two paragraphs of this section, and Bidders must satisfy themselves, through their own investigations, as to conditions to be encountered.

The Contractor shall promptly, and before the following conditions are disturbed, notify the County and Owner's Representative, in writing, of any:

A. Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law, including but not limited to PCB's, lead or asbestos.

B. Subsurface or latent physical conditions at the site differing from those indicated.

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

The County shall promptly cause an investigation of the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work, shall issue a Change Order or Construction Change Directive.

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

Nothing contained within this Section or the Contract Documents relieves the Contractor of its obligations set forth in the first two paragraphs of this Section.

4) ADDENDA: If discrepancies or apparent errors are found in the Contract Documents prior to the date of Bid opening, Bidders shall submit a written request for clarification, which response to said request will be given in the form of addenda to all Bidders, if time permits. Otherwise, in figuring the work, Bidders shall consider that any discrepancies or conflict between Contract Documents shall be governed by Paragraph 21, Intent of Plans and Specifications, and Paragraph 25, Conformance with Codes and Standards, of the General Conditions.

The correction of any discrepancies in, or omissions from the drawings, specifications, or other Contract Documents, or any interpretation thereof, during the bidding period will be made only by an addendum issued by the Owner's Representative. Each such addendum issued by the Owner's Representative shall be made a part of the Contract. Any other interpretation or explanation of such documents will not be considered binding.

5) BID: The Contractor's Bid shall be made on the form provided, with all items filled out, and properly signed. The Bid shall be signed in longhand; by the Contractor if an individual, by a member of the partnership, or by an officer of a corporation authorized to sign contracts in its behalf. If made by a corporation, the Bid shall show the name of the State under the laws of which the corporation is chartered or organized.

Bidders are warned against making erasures or alterations of any kind on their Bid. Bids which contain omissions, erasures, alterations, conditions, or additions not called for may be rejected.

The Bid shall be enclosed in a sealed envelope having the name of the Project, as it appears on the Bid, and the name and address of the Bidder shown thereon.

6) LIST OF SUBCONTRACTORS: In accordance with California Public Contract Code, Chapter 4 (commencing with Section 4100), Part 1, Division 2 of the Public Contract Code of the State of California (Subletting and Subcontracting Fair Practices Act), each Bid shall have listed on the form provided with the Bid: (a) the name and location of the place of business of each subcontractor who will perform work or labor or render service to the prime contractor, in or about the construction of the work or improvement, or a subcontractor licensed by the State of California, who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of one percent (0.5%) of the prime contractor's total Bid, and (b) the portion of the work which will be done by each subcontractor. The Contractor shall list only one subcontractor for each such portion as defined by the Contractor in Contractor's Bid.

If Contractor fails to specify a subcontractor for any portion of the work to be performed under this Contract in excess of one-half of one percent (0.5%) of the total Bid, Contractor agrees to perform that portion itself.

7) WITHDRAWAL OF BID: A Bid may be withdrawn at any time prior to the hour fixed in the Notice to Contractors for the opening of Bids by a written request of the Bidder, filed with the County. The withdrawal of a Bid will not prejudice the right of a Bidder to file a new Bid within the time prescribed.

8) OPENING OF BIDS: Bids will be opened and then read publicly at the time and place indicated in the Notice to Contractors, or as soon thereafter as is reasonable. Bidders or their representatives and others interested are invited to be present.

9) BIDDER'S BOND: The Bid must be accompanied by a Bidder's Bond, certified check, or cashier's check in an amount not less than ten percent (10%) of the amount bid. The Bidder's Bond must be signed in favor of the County, and the certified check or cashier's check must be made payable to the County of San Benito. The Contractor shall pay to the County such sums from said bond, certified check, or cashier's check as necessary to reimburse the County for costs incurred for failure of the successful Bidder to complete, sign and return in strict compliance with these Contract Documents, if requested to do so, Contractor Qualifications Questionnaire, or enter into a contract. The amount of said bond, certified check, or cashier's check shall not be deemed to constitute a penalty or liquidated damages. The County shall not be precluded by such bond, certified check, or cashier's check from recovering from the defaulting Bidder damages in excess of the amount of said

bond, certified check, or cashier's check incurred as a result of the failure of the successful Bidder to complete, sign and return in strict compliance with these Contract Documents, if requested to do so, Contractor Qualifications Questionnaire, or enter into a contract.

10) CONSIDERATION OF BIDS: After the Bids have been opened and read, they will be checked for accuracy and compliance with these Contract Documents.

Bid prices shall include everything necessary for the completion of fulfillment of the Contract, including, but not limited to, furnishing all materials, equipment, tools, labor and services, except as may be provided otherwise in the Contract Documents. When a price is quoted in both words and figures, the words shall prevail in case of a discrepancy.

Bid prices shall include allowance for all taxes, including, but not limited to, all Federal, State, and local taxes.

The County reserves the right to reject any and all Bids; to waive any minor irregularity in a Bid; and to accept one schedule of a Bid and reject another.

11) COMPETENCY OF BIDDER: The Bidder shall be licensed under the provisions of Chapter 9, Division 3, of the Business and Professions Code of the State of California to do the type of work contemplated in the Project, and shall be skilled and regularly engaged in the general class or type of work called for under this contract, with at least five (5) years of experience in the project type.

12) DISQUALIFICATION OF BIDDERS: More than one Bid in the same project trade component from any individual, firm, partnership, corporation, or association, under the same or different names, will not be considered. Reasonable grounds for believing that any Bidder is interested in more than one Bid for the work will cause the rejection of all Bids in which such Bidder is interested. If there is reason to believe that collusion exists among the Bidders, none of the participants in such collusion will be considered. Any Bid in which the prices obviously are unbalanced may be rejected.

13) RELIEF OF BIDDERS: Attention is directed to the provisions of Public Contract Code section 5100, and following, concerning relief of Bidders, and in particular to the requirement therein that if the Bidder claims a mistake was made in Contractor's Bid, the Bidder shall give the County written notice within five (5) days after opening of the Bids of the alleged mistake, specifying in the notice in detail how the mistake occurred.

14) AWARD OF CONTRACT: Award of the Contract, if awarded at all, will be to the lowest responsive, responsible Bidder whose Bid complies with the specified requirements. The award, if it be awarded, will be made by the County within sixty (60) days after opening of the Bids.

The lowest responsive, responsible Bid will be determined by the Base Bid. The County reserves the right to include in the Contract, if a Contract is awarded, the Base Bid only, or the Base Bid plus any alternate Bid or combinations of alternates Bid.

15) RETURN OF BID GUARANTEES: When the award of the contract has been made, the Bid guarantees accompanying the three lowest responsive, responsible Bids shall be retained. All other guarantees for Bids not to be further considered in making the award will be returned. The retained guarantees will be returned when the Contract has been fully signed.

16) SIGNING OF CONTRACT: A Contract shall be signed by the successful Bidder in triplicate on the form provided and returned to the County, within ten (10) days after date of dispatch of the Contract forms. After signing by the County, one copy will be delivered to the Owner's Representative, and one copy shall be returned to the Contractor.

If the Bidder to whom the award is made fails or refuses to enter into the Contract within ten (10) calendar days from the time the Contract forms are dispatched by the County, Paragraph 9, Bidder's Bond, of these General Conditions shall apply. The County may then award the Contract to the next lowest responsive, responsible Bidder. This will be done after the failure or refusal of the lowest responsive, responsible Bidder to enter into the Contract, as is convenient for the County. If the next lowest responsive, responsible Bidder fails or refuses to enter into the Contract, then Paragraph 9, Bidder's Bond, of these General Conditions shall apply. The County may then award the Contract to the next lowest responsive, responsible Bidder.

17) CONTRACT BONDS: Within ten (10) days of County's dispatch of Notice of Award, the Contractor shall furnish corporate surety bonds to the benefit of the County, issued by a surety company acceptable to the County and authorized and admitted to do business in the State of California, as follows:

A. Faithful Performance Bond -- In a sum not less than one hundred percent (100%) of the total contract price as set forth in the Contract to guarantee the Contractor's faithful performance of all covenants and stipulations of the Contract. The bond shall contain a provision that the surety thereon waives the provisions of Sections 2819 and 2845 of the Civil Code of the State of California.

B. Payment Bond -- In a sum not less than one hundred percent (100%) of the total contract price as set forth in the Contract to guarantee the payment of wage, and bills contracted for materials, supplies, or equipment used in the performance of the Contract. The bond shall be in accordance with the provisions of Sections 3225, 3226, and 3247 to 3252, inclusive, of the Civil Code of the State of California, and Section 13020 of the Unemployment Insurance Code of the State of California. Said bond shall also contain a provision that the surety thereon waives the provisions of Sections 2819 and 2845 of the Civil Code of the State of California.

Faithful Performance Bond and Payment Bond samples are contained within these Contract Documents.

18) NOTIFICATION OF SURETY COMPANIES: The surety companies shall familiarize themselves with all provisions and conditions of the Contract. It is understood and agreed that the surety or sureties waive the right of special notification of any modifications or alterations, omissions or reductions, extra or additional work, extensions of time, or any other act or acts by the County or its authorized agents under the terms of the Contract; and failure to so notify the surety companies of such changes shall in no way relieve the surety or sureties of their obligations under this Contract. The surety expressly waives the provisions of Sections 2819 and 2845 of the Civil Code of the State of California.

19) INSURANCE: Within ten (10) days of County's dispatch of Notice of Award, the Contractor shall furnish a Certificate of Insurance substantiating the fact that Contractor has taken out the insurance hereinafter set forth for the period covered by the Contract with an insurance carrier acceptable to the County and under terms satisfactory to the County. Insurance industry's standard Accord Certificate of Insurance or binder forms shall bear an endorsement precluding the cancellation or reduction of coverage of any policy covered by such Certificate or binder before the expiration of thirty (30) days after the County shall have received notification of such cancellation, suspension, reduction, or voided coverage. Contractor shall immediately furnish copies of its insurance policies required under this Contract to the County upon request. In the event Contractor does not have a Certificate of Insurance or binder evidencing the proper insurance coverages, the Contractor shall not be allowed on the work site.

All insurance policies shall by endorsement include the County of San Benito, its officers, employees, agents, inspectors, construction managers, project managers, consultants, subconsultants, their officers and employees, and each of them, as additional insureds to protect, as well as to provide the defense of, from all suits, actions, damages, liability, or claims of every type and description to which they may be subjected or put by reason of, or resulting from, the Contractor's performance of the Contract. Contractor's insurance shall apply as primary insurance, and any other insurance carried by the additional insureds identified above shall apply as excess and will not contribute with this insurance.

Each insurance policy shall include the following provisions: (1) The standard severability of interest clause in the policy and when applicable the cross liability insurance coverage provision which specifies that the inclusion of more than one insured shall not operate to impair the rights of one insured against another insured, and the coverages afforded shall apply as though separate policies had been issued to each insured; (2) It acts as primary insurance, and that no insurance held or owned by the County shall be called upon to cover, either in full or in part, any loss covered under the policy acquired by Contractor; and (3) The stated limits of liability coverage for Commercial/Comprehensive General Liability, and Business Automobile Liability, assumes that the standard "supplementary payments" clause will pay in addition to the applicable limits of liability and that these supplementary payments "are not included as part of the insurance policies limits of liability." If any of the policies indicate that defense costs are included in the general aggregate limit, then the required general aggregate limits shall be a minimum of \$2,000,000 or more at the County's discretion.

If the Contractor fails to maintain such insurance, the County may take out insurance to cover damages of the below-mentioned classes for which the County might be held liable on account of the Contractor failing to pay such damages and deduct and retain the amount of the premium for such insurance from any sums due the Contractor under the Contract. Failure of the County to obtain such insurance shall in no way relieve the Contractor from any of its responsibilities under the Contract.

Without limiting Contractor's duty to indemnify, the minimum insurance coverages to be obtained by the Contractor as hereinabove referred to are as follows:

A. Commercial General Liability Insurance, including but not limited to premises and operations, including coverage for Bodily Injury and Property Damage, Personal Injury, Contractual Liability, Broadform Property Damage, Independent Contractors, Products and Completed Operations, with a combined single limit for Bodily Injury and Property Damage of not less than \$2,000,000 per occurrence. The required endorsement form for Commercial General Liability Additional Insured is ISO Form CG 20 10 11 85 or CG 20 10 10 01 in tandem with CG 20 37 10 01 (2000).

B. All Risk Property Coverage or Builders Risk Insurance in an amount equal to or greater than the contract amount and shall cover the full replacement cost of the building and improvements in the event of loss, damage, or destruction by fire or other perils commonly covered by standard extended coverage. Such amount shall be adjusted in accordance with adjustments in the contract amount. The subject insurance policy shall protect the interest of County, Contractor, subcontractors and sub-subcontractors with respect to work performed under this contract, and shall provide broad form all-risks coverage, including insuring against perils of fire, theft, flood, vandalism, malicious mischief, collapse and debris removal. Contractor shall be responsible for all losses to the work performed under this contract until completion of the work and final payment by owner. Contractor shall maintain property insurance until such final payment has been made by owner.

C. Business Automobile Liability Insurance, covering all motor vehicles, including owned, leased, non-owned, and hired vehicles, used in providing services under this Agreement, with a combined single limit for Bodily Injury and Property Damage of not less than

\$1,000,000 per occurrence. The required endorsement form for Automobile Additional Insured endorsement is ISO Form CA 20 48 02 99.

D. Workers' Compensation Insurance, The Contractor shall be a qualified self-insurer or shall carry full Workers' Compensation and Employers' Liability insurance coverage, either through the State Compensation Insurance Fund or a standard approved policy obtained from a licensed insurance carrier for all persons employed, either directly or through subcontractors, in carrying out the work under this Contract in accordance with the "Workers' Compensation and Insurance Act," Division IV thereof. Employers' limits of liability shall be the prevailing statutory limits of liability.

Any exceptions to the provisions of this section must be delineated in the Contract Documents. In addition, it is understood and agreed that an excess insurance policy or an umbrella policy (following form) may be utilized to meet the above-required limits of liability for Commercial/Comprehensive General Liability, Business Automobile Liability policy, and the Workers' Compensation Employers' Liability.

20) PRE-CONSTRUCTION CONFERENCE: Prior to the start of construction, a conference will be called by the County or Owner's Representative for the purpose of reviewing the construction program with the Contractor. At this conference, the sequence of work, methods of access to the construction site and temporary facilities shall be reviewed by the Contractor and County. Coordination of utilities within the project limits, including relocations and maintenance of existing facilities and additions thereto, shall be confirmed in writing by utility representatives and the Contractor at this conference, or within five (5) working days thereafter.

21) INTENT OF PLANS AND SPECIFICATIONS: It is the intent of these Contract Documents that the work performed under the Contract shall result in a complete operating system in satisfactory working condition with respect to the functional purposes of the installation, and no extra compensation will be allowed for anything omitted but fairly implied. The prices paid for the various items in the Bid shall include full compensation for furnishing all labor, materials, tools, equipment, overhead, profit, incidentals, and doing all work necessary to complete the finished product as provided in the Contract Documents.

The specifications and drawings are intended to be explanatory of each other. Any work shown on the drawings, and not in the specifications, or vice versa, is to be treated as if indicated in both. In the case of conflict or inconsistency, the Supplementary Conditions (if any) shall control over the General Conditions, the General Conditions shall control over the Technical Specifications, and the Technical Specifications shall control over the drawings. Figured dimensions shall control over scaled measurements. In all cases, the more costly or expensive interpretation is deemed to control and be the interpretation incorporated into the Contract Documents and Contract Sum.

Organization of the specifications into various subdivisions and the arrangement of the drawings shall not control Contractor in dividing the work among subcontractors or in establishing the extent of work to be performed by any trade.

Unless otherwise stated in the Contract Documents, technical words and abbreviations contained in the Contract Documents are used in accordance with commonly understood construction industry meanings, and nontechnical words and abbreviations are used in accordance with their commonly understood meanings.

The Contract Documents may 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. The use of the word "including," when following any general statement, shall not be construed to limit such statement to specific items

or matters set forth immediately following such word or to similar items or matters, whether or not nonlimiting language (such as "without limitation," "but not limited to," or words of similar import) is used with reference thereto, but rather shall be deemed to refer to all other items or matters that could reasonably be deemed to fall within the broadest possible scope of such general statement.

Whenever the context so requires, the use of the singular number shall be deemed to include the plural and vice versa. Each gender shall be deemed to include any other gender, and each shall include corporation, partnership, trust, or other legal entity whenever the context so requires. The captions and headings of the various subdivisions of the Contract Documents are intended only as a matter of reference and convenience, and in no way define, limit, or prescribe the scope or intent of the Contract Documents or any subdivision thereof.

Contractor shall assume responsibility for design of systems and fabrications needed to meet performance criterion described in the Contract Documents. Design by Contractor shall include, but is not limited to, concrete form work, casework joinery, fire sprinkler systems, mechanical and electrical systems represented diagrammatically on Contract Drawings. Design shall be governed by descriptive criterion specified for each item. Contractor shall also assume responsibility for temporary structures used to implement construction such as shoring and scaffolding.

22) CLARIFICATION OF CONTRACT DOCUMENTS: Should it appear that the work to be done, or any of the matters relative thereto, are not sufficiently detailed or explained in the Contract Documents, or in the event of any doubt or question arising respecting the true meaning of the Contract Documents, the Contractor shall apply to the Owner's Representative for such further explanations as may be necessary. The Contractor shall thoroughly review all Requests for Information (RFI's) submitted by subcontractors prior to submission to the Owner's Representative to determine whether such RFI is already answered in the Contract Documents. Contractor represents to County and Owner's Representative, that by submission of an RFI, Contractor has thoroughly reviewed the RFI and thoroughly reviewed the Contract Documents, and determined that the RFI is not answered or reasonably inferable in the Contract Documents, and that the RFI pertains to an unforeseen condition or circumstance that is not described in the Contract Documents, that there is a conflict or discrepancy in the Contract Documents, or there is an omission in the Contract Documents. In the event any RFI is answered or reasonably inferable from the Contract Documents, Contractor agrees to pay the Owner's Representative and County the reasonable cost for their time and expenses associated with reviewing and responding to RFI's which are already answered or reasonably inferable from the Contract Documents. In the event of a disagreement over such compensation, the judgment of the Owner's Representative shall control.

23) PLANS AND SPECIFICATIONS TO BE FURNISHED: The Contractor will be furnished, free of charge, *three (3)* copies of the Contract Documents. The Contractor shall retain an approved complete set of Contract Documents on the job at all times during the progress of the work.

24) SUPPLEMENTAL DRAWINGS AND INSTRUCTIONS: In addition to the drawings incorporated in the Contract at the time of signing, the architect or engineer may furnish such working drawings and supplemental drawings from time to time as may be necessary to make clear, or to define in greater detail, the intent of the Contract drawings and specifications. In furnishing such additional drawings and/or instructions, the architect or engineer shall have authority to make minor changes in the work, not involving extra cost, and not inconsistent with the nature of the work. These working drawings and supplemental drawings shall become a part of the Contract Documents, and the Contractor shall make its work conform to them.

25) CONFORMANCE WITH CODES AND STANDARDS: All work and materials shall be in full accordance with the latest adopted standards and regulations of the State Fire Marshal; the California Building Code; the California Electrical Code; the California Plumbing Code; Americans With Disabilities Act; Cal OSHA; and all other applicable codes, laws, or regulations. Nothing in these

Contract Documents is to be construed to permit work not conforming to these requirements. Contractor agrees that immediately upon signing of the Contract, Contractor will diligently review the Contract Documents and determine if any work described or inferred within the Contract Documents is not in conformance with these requirements. Should Contractor discover work within the Contract Documents not in conformance with these requirements, Contractor agrees to immediately notify Owner's Representative in writing of said nonconformance, and to not proceed with nonconforming work. When the work detailed in the Contract Documents differs from governing codes, it is understood and agreed that the Contract Sum is based upon the more costly or expensive standard.

26) PERSONAL ATTENTION AND SUPERINTENDENCE: The Contractor shall give Contractor's personal attention to, and shall supervise the work to the end that it shall be faithfully prosecuted. Contractor shall keep on the work at all times throughout its progress, a competent superintendent who shall represent the Contractor in Contractor's absence, and shall have complete authority to represent and act for the Contractor. Whenever the Contractor or Contractor's superintendent is not present on a particular part of the work, the Owner's Representative or County may stop the work until the Contractor or Contractor's superintendent arrives.

The Contractor shall be liable for the faithful observation of any instructions delivered to Contractor or to Contractor's authorized representatives. Any order given by the Owner's Representative not otherwise required by the specifications to be in writing will, on request of the Contractor, be given or confirmed by the Owner's Representative in writing.

27) BEGINNING OF WORK: The Notice to Proceed shall constitute authority for the Contractor to enter upon the site of the work and to begin operations, upon condition that the Contractor has strictly complied with all requirements of these Contract Documents, including but not limited to, furnishing all required documentation and certificates of insurance. If Contractor has not provided County with all documents required by these Contract Documents as of the date of the Notice to Proceed, Contractor shall not be allowed on the site of the work or allowed to start work on the Project, notwithstanding the issuance of a Notice to Proceed.

When the Contractor has started work on the Project, the Contractor shall diligently prosecute the work to completion within the time limit provided in the Contract Documents.

The Contractor shall give the County and Owner's Representative at least two (2) working days' notice of Contractor's intention to start work, specifying the time, date, and location at which the Contractor intends to begin.

Contract time shall begin five (5) days after the date of dispatch of the Notice to Proceed, whether or not Contractor is allowed on the work site due to Contractor's failure to furnish County with all documentation required by these Contract Documents. In no event shall there be a period of time greater than thirty (30) days, from the time the Contract is dispatched by the County to the Contractor and the commencement of the Contract Time, regardless of the receipt or lack thereof by County of all documents required by these Contract Documents.

28) PROGRESS SCHEDULE: The County's receipt of a proposed progress schedule and monthly updated progress schedules, all in strict compliance with these Contract Documents shall be conditions precedent to the Owner's Representative's or County's approval of the Contractor's periodic pay requests and/or the County's obligation to request payment be issued to Contractor.

The Contractor shall, to every reasonable extent, carry on the work of construction of the various elements of the project concurrently, and shall not defer construction of any portion of the work in favor of any other portion without the express written approval of the Owner's Representative or County.

29) RESPONSIBILITY FOR ACCURACY: The Contractor shall obtain all necessary measurements for and from the work, and shall check dimensions, elevations, and grades for all layout and construction work and shall supervise such work, the accuracy for all of which Contractor shall be responsible. Each subcontractor shall adjust, correct, and coordinate Contractor's work with the work of others so that no discrepancies will result in the whole work.

Contractor shall be responsible for verifying that all information and data contained and set forth in all of Contractor's submittals that may be required by the Contract Documents, comply in all respects with the Contract Documents.

30) EFFECT OF INSPECTION OR USE: Neither the inspection by an inspector, County, Owner's Representative, construction manager, architect, engineer, or anyone acting in their behalf, nor any measurement, approved modification, submittal, shop drawing, order, or certificate, nor acceptance of any part or whole of the work, nor payment of money, nor any possession or use by the County or its agents, shall operate as a waiver of any provisions of the Contract or of any power or authority reserved therein, or of any right to damages thereunder; nor shall the waiver of any breach of this Contract be held to be a waiver of any subsequent or other breach.

31) INSPECTION: All work done and all materials and equipment furnished under this Contract shall be subject to the inspection and approval of the Owner's Representative and/or County. They shall at all times have access to the work during its construction, and shall be furnished with every reasonable facility and assistance for ascertaining that the materials and workmanship are in accordance with the requirements and intent of the Contract Documents. Any work constructed without inspection as provided above, except with the specific written consent or approval of the Owner's Representative and Construction Manager, or constructed contrary to the instructions or orders of the Owner's Representative, Construction Manager, or his or her authorized representative, must, if requested by the Owner's Representative or County, be uncovered for examination and properly restored at the Contractor's expense.

The inspection of the work by County, the County's inspector(s), Construction Manager, architect, engineer, consultants or anyone acting in their behalf, does not relieve the Contractor of any of Contractor's obligation to fulfill the Contract as prescribed. Any work, materials, or equipment not meeting the requirements and intent of the Contract Documents shall be rejected, and unsuitable work or materials shall be made good, notwithstanding the fact that such work or materials may have previously been inspected or approved and payment therefor may have been made. If nonconforming work, materials, or equipment not meeting the requirements and intent of the Contract Documents is discovered, and the Contractor fails to remedy the nonconforming work, materials, or equipment, or the County agrees in writing to accept the nonconforming work, materials, or equipment, Contractor agrees to sign a Change Order or otherwise reimburse County in a sum equal to the cost to remedy the nonconforming work, materials, or equipment. It is expressly understood and agreed that the County will be entitled to recover from Contractor the full cost of remedying nonconforming work, materials, or equipment, and that diminution in value will not be considered as a method for valuing the County's damages for nonconforming work, materials, or equipment, and further that the doctrine of economic waste will not be a defense to the County's recovery from Contractor of the full and complete cost and expense of remedying nonconforming work, materials, or equipment.

Re-examination of any work may be ordered by the County, Construction Manager and/or the Owner's Representative, and such work must be uncovered by the Contractor. The Contractor shall pay the entire cost of such uncovering, re-examination, and replacement if the work does not conform to the Contract Documents.

32) REMOVAL OF REJECTED MATERIALS OR WORK: The Contractor shall, upon request and without delay, remove from the site of the work, all rejected or condemned materials of any kind brought to, or incorporated in, the work. No such rejected or condemned materials shall again be

offered for use in any work under the Contract. All work which has been rejected shall be remedied, or removed and replaced, by the Contractor in a manner acceptable to the County at Contractor's expense.

Upon failure of the Contractor to comply within forty-eight (48) hours with any written order of the County or Owner's Representative made under this section, or to make satisfactory progress in so doing, the County may cause such rejected materials to be removed, or such rejected work to be remedied, or removed and replaced, and deduct and retain the costs from any sums due or to become due to the Contractor.

33) USE OF COMPLETED PORTIONS: The County shall have the right at any time during the progress of this work to take over and place in service any completed or partially completed portion of the work, notwithstanding the time for completion of the entire work or such portions which may not have expired; but such taking possession thereof shall not be deemed an acceptance of any of the work, nor work on those portions not completed in accordance with the Contract Documents.

34) MEANS AND METHODS: Neither Owner's Representative nor County will have control over, be in charge of, nor be responsible for construction means, methods, techniques, sequences, or procedures, or for the safety precautions and programs in connection with the work, since these are solely Contractor's responsibility, unless otherwise required by the Contract Documents.

35) DELAYS: The Contractor agrees to complete all of its work required in the Contract Documents, or any subsequent revisions or modifications thereto, within the time specified in the Bid, subject to Change Orders increasing or decreasing the time specified. It is agreed by the parties to this Contract that time is of the essence to the performance of this Contract by Contractor, and that in case all work called for under the Contract is not completed in all respects and requirements within the time called for in the Contract Documents, plus any agreed upon extensions of time, damage will be sustained by the County.

36) EFFECT OF EXTENSION OF TIME: The granting of an extension of time for the completion of the work on account of delays which, in the judgment of the County, are unavoidable delays, or granted for the performance of extra or additional work, shall in no way operate as a waiver on the part of the County of any of its rights under this Contract.

37) CLAIMS: A Claim is any request by Contractor to adjust, alter, modify, or otherwise change the Contract Sum or the Contract Time, or both. A Claim must be stated with specificity, including identification of the event or occurrence giving rise to the Claim, the date of the event, and the asserted effect on the Contract Sum and the Contract Time, if any. The Claim shall include adequate supporting data. Adequate supporting data for a Claim for an adjustment of the Contract Time shall include scheduling data demonstrating the impact of the event on the critical path and completion of the Project. Adequate supporting data for a Claim for an adjustment in the Contract Sum shall include a detailed cost breakdown of items included within the Claim and documentation supporting each item of cost.

Contractor shall submit all Claims to the County before proceeding to perform the work, or portions of the work, giving rise to such Claim. Contractor hereby expressly waives any Claims of which Contractor was aware, whether or not the exact amounts of such Claims were ascertainable, and that are not submitted to the County prior to Contractor proceeding to perform the work, or portions of the work, giving rise to such Claims.

All Claims shall be submitted to County and Owner's Representative for decision within fifteen (15) days after the event or occurrence giving rise to the Claim. Contractor hereby expressly waives all Claims not made within the aforesaid time limit.

Claims must be submitted to County before the date of final payment. Contractor hereby expressly waives all Claims not submitted, in complete and proper form, on or before the date of final payment.

Contractor expressly waives any Claims for delay or adjustment to the Contract Time if the Contractor fails to provide written notice to County within three (3) days of the event or occurrences giving rise to the delay. Said written notice shall include the event or occurrence giving rise to the delay, the estimated duration of the delay, and the impact of the event or occurrence upon the critical path and completion of the Project. Contractor will not be entitled to adjustments to the Contract Time for delays attributable to weather, unless such delays are attributable to weather which is abnormal and delays the completion of the Project. A determination of abnormal weather is to be based upon locally recognized annual weather patterns for the month in which the abnormal weather occurs.

As used herein, the following terms shall have the following meanings:

"Excusable Delay" means any delay of the completion of the Project beyond the expiration of the Contract Time caused by conditions beyond the control and without the fault or negligence of the Contractor such as strikes, embargoes, fire, unavoidable casualties, unusual delays in transportation, national emergency, and stormy and inclement weather conditions in which the work cannot continue. The financial inability of the Contractor or any subcontractor and default of any subcontractor, without limitation, shall not be deemed conditions beyond the Contractor's control. An Excusable Delay may entitle the Contractor to an adjustment in the Contract Time.

"Compensable Delay" means any delay of the completion of the work beyond the expiration date of the Contract Time caused by the gross negligence or willful acts of the County or Owner's Representative, and which delay is unreasonable under the circumstances involved, and not within the contemplation of the parties. A Compensable Delay may entitle the Contractor to an extension of the Contract Time and/or Contract Sum. Except as provided herein, the Contractor shall have no claim for damage or compensation for any delay, interruption, hindrance, or disruption.

"Inexcusable Delay" means any delay of the completion of the Project beyond the expiration of the Contract Time resulting from causes other than those listed above. An Inexcusable Delay shall not entitle the Contractor to an extension of the Contract Time or an adjustment of the Contract Sum.

The Contractor may make a Claim for an extension of the Contract Time, for an Excusable Delay or a Compensable Delay, subject to the following:

A. If an Excusable Delay and a Compensable Delay occur concurrently, the maximum extension of the Contract Time shall be the number of days from the commencement of the first delay to the cessation of the delay which ends last.

B. If an Inexcusable Delay occurs concurrently with either an Excusable Delay or a Compensable Delay, the maximum extension of the Contract Time shall be the number of days, if any, by which the Excusable Delay or the Compensable Delay exceeds the Inexcusable Delay.

C. If an Inexcusable Delay occurs concurrently with both an Excusable Delay and a Compensable Delay, the maximum extension in the Contract Time shall be the number of days, if any, by which the number of days determined pursuant to Subparagraph (a) exceeds the number of days of the Inexcusable Delay.

D. For a Compensable Delay, the Contractor shall only be entitled to an adjustment in the Contract Sum in an amount equal to the actual additional labor costs, material costs, and unavoidable equipment costs incurred by the Contractor as a result of the Compensable Delay,

plus the actual additional wages or salaries and fringe benefits and payroll taxes of supervisory and administrative personnel necessary and directly employed at the Project site for the supervision of the work during the period of Compensable Delay. Except as provided herein, the Contractor shall have no claim for damage or compensation for any delay, interruption, hindrance, or disruption. There shall be no Compensable Delay unless the event or occurrence giving rise to the Compensable Delay extends the actual completion of the Project past the Contract Time.

The parties agree that the County's exercise of its rights to order changes in the work, regardless of the extent and number of changes, or to suspend the work, is within the contemplation of the parties and shall not be the basis for any Claim for Compensable Delay. The rights of the Contractor to adjustments of the Contract Time and the Contract Sum, based on changes ordered in the work or suspension of the work, shall be solely governed by this provision.

38) FALSE CLAIMS: California Penal Code section 72, provides that any person who presents for payment with intent to defraud any County board or officer, any false or fraudulent claim, bill, account, voucher, or writing, is punishable by fines not exceeding ten thousand dollars (\$10,000.00) and/or imprisonment in the state prison.

Government Code sections 12650, et seq., pertains to civil penalties that may be recovered from persons (including corporations, etc.) for presenting a false claim for payment or approval, presents a false record or statement to get a false claim paid or approved, or other acts, to any officer or employee of any political subdivision of the State of California. Any person or corporation violating the provisions of Government Code sections 12650, et seq., shall be liable for three times the amount of the damages of the political subdivision, plus a civil penalty, plus costs.

All Claims by Contractor, shall include the following certification, properly completed and executed by Contractor or an officer of Contractor:

I, _____, BEING THE _____ (MUST BE AN OFFICER) OF _____ (CONTRACTOR), DECLARE UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA, AND DO PERSONALLY CERTIFY AND ATTEST THAT: I HAVE THOROUGHLY REVIEWED THE ATTACHED CLAIM FOR ADDITIONAL COMPENSATION AND/OR EXTENSION OF TIME, AND KNOW ITS CONTENTS, AND SAID CLAIM IS TRUTHFUL AND ACCURATE; THAT THE AMOUNT REQUESTED ACCURATELY REFLECTS THE CONTRACT ADJUSTMENT FOR WHICH THE OWNER IS LIABLE; AND, FURTHER, THAT I AM FAMILIAR WITH CALIFORNIA PENAL CODE SECTION 72 AND CALIFORNIA GOVERNMENT CODE SECTION 12650, ET SEQ, PERTAINING TO FALSE CLAIMS, AND FURTHER KNOW AND UNDERSTAND THAT SUBMISSION OR CERTIFICATION OF A FALSE CLAIM MAY LEAD TO FINES, IMPRISONMENT AND/OR OTHER SEVERE LEGAL CONSEQUENCES.

Submission of a Claim, in conformance with all of these requirements of this Contract, and rejection of all or part of said Claim by County, is a condition precedent to any action by Contractor against County, including but not limited to, the filing of a lawsuit or making demand for arbitration, if arbitration is expressly provided for in this Contract.

39) CHANGES: The County may request that Contractor provide County with estimated costs for proposed changes to the work. Contractor agrees to promptly provide County with detailed, itemized costs for proposed changes to the work and scheduling data demonstrating the impact, if any, of the proposed changes to the work on the Contract Time. Adjustments, if any, in the amount to be paid the Contractor by reason of any modifications of the work as set forth in a Contract Change Order, Construction Change Directive, or arising from Claims shall be determined by one or more of the following methods as elected by the County:

A. Lump Sum Price - By an acceptable lump proposal from the Contractor.

B. Unit Prices - By unit prices fixed by agreement between the County and the Contractor.

C. Force Account - By ordering the Contractor to proceed with the work and to keep and present in such form as the Owner's Representative or County may direct, a correct account of the cost of the change, together with all vouchers and associated documentation therefor. The Contractor will be paid for labor, materials, and equipment rental actually used on the Change Order work as follows:

(1) Labor - the Contractor will be paid the reasonable cost of labor for the workmen (including foremen when authorized by the Owner's Representative), used in the actual and direct performance of the work. The cost of labor, whether the employer is the Contractor, subcontractor, or other forces, will be the sum of the following:

(1-1) Actual Wages - The actual wages paid shall include any reasonable employer payments to or on behalf of the workmen for health and welfare, pension, vacation, and similar purposes.

(1-2) Labor Surcharge - The labor surcharge to be added to the actual wages shall be the reasonable cost of all additional payments made to, or on behalf of the workers, other than actual wages, as required by State or Federal laws, including by way of example but not limited to, workers' compensation, SUTA, FUTA and FICA.

(1-3) Subsistence and Travel Allowance - The actual reasonable and necessary subsistence and travel allowance paid to such workers.

(2) Materials - The actual cost of the materials to the purchaser, whether the Contractor, a subcontractor, or other forces. If the Contractor does not furnish satisfactory evidence of the cost of such materials, it shall be deemed to be the lowest current wholesale price at which such materials are available in the quantities concerned delivered to the job site. The County reserves the right to furnish such materials as it deems advisable, and the Contractor shall have no claims for costs or profit on such County furnished materials.

(3) Equipment - The use of equipment shall be paid for at the rates listed for such equipment in the current compilation of rental rates of the State of California, Department of Transportation (CalTrans) Division of Highways, applicable to San Benito County or competitive local rental rates of established rental agencies serving the area of the work, whichever is less. If the equipment is not shown on the above-mentioned list, Contractor shall be paid such hourly rental rates as are agreed upon by the Contractor and the Owner's Representative prior to use of the equipment, except that in no case shall such agreed hourly rate exceed the rental rates of established distributors or equipment rental agencies serving the area, plus thirty-three and one-third percent (33-1/3%) for the cost of fuel, oil, lubrication, and field repairs and maintenance.

If the equipment is moved on to the work and used exclusively for extra work, the Contractor will be paid for the cost of transporting it to the job and returning it to its original location. The rental period shall begin when the equipment is unloaded at the site of the extra work, and shall include each day that the equipment is at the site of, and performing or utilized for, such extra work, excluding Saturdays, Sundays, and legal holidays, unless extra work is performed on such days, and shall terminate at the end of

the day on which such extra work is completed or the Owner's Representative directs the Contractor to discontinue the use of such equipment.

The rental time to be paid for equipment already on the work, or which is used for other than such extra work, shall be the actual time the equipment is in operation on the extra work, plus the time required to move the equipment to the site of the extra work and return it to its original location.

To the totals as computed above, shall be added the following percentages for profit and overhead:

Labor	Fifteen Percent (15%)
Materials	Fifteen Percent (15%)
Equipment Rental	Fifteen Percent (15%)

For Change Order work performed by a subcontractor, compensation for such work shall be based on all direct costs as listed in the subcontractor's portion of the proposal plus the above percentages. The Contractor may add ten percent (10%) to the subcontractor's proposal for Contractor's overhead and profit. Contractor may also add actual cost of subcontractor's bond (if any) and a markup on such bond not to exceed one percent (1%). Overhead and profit for all tiers of Contractor and subcontractors shall in no event exceed fifteen percent (15%) of the cost of the work. Distribution of the overhead and profit among the Contractor and the subcontractors is the responsibility of the Contractor.

The allowances for overhead and profit as enumerated in the preceding subparagraphs shall include full compensation for any and all items of overhead including but not limited to, superintendence, field overhead, home office overhead (absorbed and unabsorbed), Contractor bonds, insurance, general conditions, clean-up, safety meetings, mandated programs and processing of Claim and Change Order documents.

The amount of payment agreed upon or, in the absence of agreement, selected by the County shall be set forth in the Change Order or Construction Change Directive.

40) PAYMENTS: Within ten (10) days after signing the Contract, but in any event prior to the first application for payment, Contractor shall submit to Owner's Representative and County a cost breakdown of the Contract Sum. The cost breakdown shall itemize, as separate line items, the cost of each work activity and all other costs, including warranties, record documents, insurance, bonds, overhead expenses, and the total allowance for profit, the total of which shall equal the Contract Sum. The cost breakdown shall include a separate line item cost for each activity listed on Contractor's initial (as-planned) schedule. The cost breakdown, when accepted by the County and Owner's Representative, shall become the basis for determining the cost of work performed for the Contractor's applications for payment.

On or before the first (1st) day of the month, Contractor shall submit to Owner's Representative an itemized application for payment for the cost of the work in permanent place, as approved by the Owner's Representative, which has been completed in accordance with the Contract Documents as of the twentieth (20th) day of the preceding month, less amounts previously paid. The application for payment shall be prepared in a form acceptable to County and Owner's Representative, and shall contain itemized amounts in accordance with the cost breakdown. The applications for payment shall not include requests for payment on account of changes which have not been authorized by Change Orders, or for amounts Contractor does not intend to pay a subcontractor because of a dispute or other reason. By submission of an application for payment, Contractor represents to County that all work for which Contractor is seeking compensation, has been performed in strict compliance with these Contract Documents.

If requested by the County, an application for payment shall be accompanied by a summary showing payment that will be made to subcontractors covered by such application, and unconditional waivers and releases of claims and stop notices, from each subcontractor listed in the preceding application for payment covering sums disbursed pursuant to that preceding application for payment.

Contractor warrants that upon submittal of an application for payment, all work for which certificates of payment have been previously issued and payment has been received from County, shall be free and clear of all claims, stop notices, security interests, and encumbrances in favor of Contractor, subcontractors or other persons or firms entitled to make claims by reason of having provided labor, materials, or equipment related to the work.

Approval of all, or any part, of an application for payment may be withheld, a certificate of payment may be withheld, and all or part of a previous certificate for payment may be nullified and that amount withheld from a current certificate for payment, on account of any of the following:

- (a) Defective work not remedied;
- (b) Third-party claims against Contractor or County arising from the acts or omissions of Contractor or subcontractors;
- (c) Stop notices;
- (d) Failure of Contractor to make timely payments due to subcontractors for material or labor;
- (e) A reasonable doubt that the work can be completed for the balance of the Contract Sum then unpaid;
- (f) Damage to the County or others for which Contractor is responsible;
- (g) Reasonable evidence that the work cannot be completed within the Contract Time, and the unpaid balance of the Contract Sum would not be adequate to complete the work and cover County's damages for the anticipated delay;
- (h) Failure of Contractor to maintain, update, and submit record documents;
- (i) Failure of Contractor to submit schedules or their updates as required by the Contract Documents;
- (j) Performance of the work by Contractor without properly processed shop drawings;
- (k) Liquidated damages assessed;
- (l) Any other failure of Contractor to perform its obligations under the Contract Documents.

By action of the County's Board of Supervisors, a fund has been established, money encumbered in the current budget, and assigned to the account which is the sole source of funds available for payment of the Contract Sum. Contractor understands and agrees that Contractor will be paid only from this special fund and if for any reason this fund is not sufficient to pay Contractor, Contractor will not be entitled to payment. The availability of money in this fund, and County's ability to draw from this fund, are conditions precedent to County's obligation to make payments to Contractor.

Within thirty (30) days of receipt of an approved certificate for payment, properly executed by the Contractor, Owner's Representative, County's inspector of record for the Project (if any) and County's Auditor, County agrees to pay Contractor, subject to all of the terms and conditions of these Contract Documents, an amount equal to ninety-five percent (95%) of the sum of the following (less any amounts withheld as permitted by the Contract Documents):

- (a) Cost of the work in permanent place as of the end of the preceding month as set forth and approved on the certificate for payment;
- (b) Less amounts previously paid;
- (c) Less amounts withheld by County as allowed in the Contract Documents.

There shall be a retainage from said payments in an amount equal to five percent (5%) of the amount specified in the approved certificates for payment. If at any time thereafter the

progress of the work is not satisfactory, additional amounts may be retained. Upon substantial completion of the work, any amount retained may be paid to the Contractor. When the work has been substantially completed, the County may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the work to be completed. Payments will not be made that would deplete the retainage nor place in escrow any funds that are required for retainage nor invest the retainage for the benefit of the Contractor.

In lieu of County retaining a portion of progress payments due Contractor, the Contractor may elect to deposit qualifying securities equivalent to the amount to be withheld. Upon such deposit under an escrow agreement substantially in the form specified in section 22300(e) of the Public Contracts Code, the funds shall be released.

Within forty (40) days of recordation of a Notice of Completion, County agrees to, subject to all of the terms and conditions of these Contract Documents, pay the remaining contract balance, after all offsets and subject to the withholding of amounts due from Contractor.

41) COST AND PRICING DATA: All cost and pricing data submitted by the Contractor to the County with respect to any change, prospective or completed, or any claim for extra compensation shall be a true, complete, accurate, and current representation of actual cost and pricing of the work. The Owner's Representative or his or her authorized representative may require a formal certification as to cost and pricing data submitted by the Contractor. Certification shall be in the form acceptable to County.

42) PROCEED WITH WORK: Notwithstanding the making of any Claim or the existence of any dispute regarding any Claim, Contractor shall not cause any delay, cessation, or termination in or of Contractor's performance of the work, but shall diligently proceed with performance of the work in accordance with the Contract Documents.

43) ACCESS TO RECORDS: The Owner's Representative and/or County, or their authorized representatives, shall have access, upon reasonable notice, during normal business hours, to Contractor's and subcontractors' books, documents and accounting records, including but not limited to, Bid worksheets, Bids, subcontractor Bids, estimates, cost accounting data, accounting records, payroll records, time sheets, cancelled checks, profit and loss statements, balance sheets, project correspondence including but not limited to all correspondence between Contractor and its sureties and subcontractors/vendors, project files, scheduling information, and other records of the Contractor and all subcontractors directly or indirectly pertinent to the work, original as well as change and claimed extra work, to verify and evaluate the accuracy of cost and pricing data submitted with any Change Order, prospective or completed, or any Claim for which additional compensation has been requested or notice of potential Claim has been tendered.

Such access shall include the right to examine and audit such records, and make excerpts, transcriptions, and photocopies at County's cost.

The parties agree that in the event Contractor or any subcontractor fails to comply with this section, it would be difficult for the County to determine its actual damages; therefore, Contractor agrees to pay County, as liquidated damages, the sum of two hundred dollars (\$200.00), which Contractor agrees is reasonable under the circumstances, for each and every calendar day which Contractor or a subcontractor fails or refuses to provide the County, Owner's Representative, and/or their authorized representatives, access to the materials specified in this section.

Contractor agrees to impose upon its subcontractors by appropriate subcontract provision, the obligations of this section of the General Conditions.

44) DISMISSAL OF UNSATISFACTORY EMPLOYEES: If any person employed by the Contractor, or any subcontractor, shall fail or refuse to carry out the directions of the Owner's Representative or County; or, in the opinion of the Owner's Representative or County, is incompetent, unfaithful, intemperate, or disorderly; uses threatening or abusive language to any person representing the Owner's Representative or County on the work; or is otherwise unsatisfactory, he or she shall be removed from the work immediately, and shall not again be employed on the work.

45) TERMINATION OF UNSATISFACTORY SUBCONTRACTS: When any portion of the work which has been subcontracted by the Contractor is not being prosecuted in a satisfactory manner, the subcontract for such work shall be terminated immediately by the Contractor upon written notice from the Owner's Representative or County, and the subcontractor shall not again be employed on the type of work in which his or her performance was unsatisfactory.

46) TEMPORARY SUSPENSION OF WORK: The County shall have the authority to suspend the work wholly or in part for such period as it may deem necessary, due to unsuitable weather, lack of adherence to safety regulations, or to any other conditions it considers unfavorable for the suitable prosecution of the work, or for such time as it may deem necessary, due to the failure on the part of the Contractor to carry out orders given or to perform any provisions of the Contract, or for any other reason. The Contractor shall immediately comply with such written order of the County to suspend the work wholly or in part. The suspended work shall be resumed only when conditions are favorable or methods are corrected, as ordered or approved in writing by the County.

If a suspension of the work is ordered by the County due to the failure on the part of the Contractor to carry out orders or to perform any provisions of the Contract, the days on which the suspension order is in effect shall count against the Contract time, and shall not in any way modify or invalidate any of the provisions of this Contract, and the Contractor shall not be entitled to any damages or compensation on account of such suspension or delay.

47) TERMINATION OF CONTRACTOR'S CONTROL OVER THE WORK: Whenever, in the opinion of the County, the Contractor has failed to supply an adequate force of labor, equipment, or materials of proper quality, or has failed in any other respect to prosecute the work with the diligence specified in the Contract; or if Contractor should refuse or fail to comply with laws, ordinances, or directions of the Owner's Representative; or if Contractor should fail to make prompt payments to subcontractors or for labor or materials; or otherwise be in breach of this Contract; the County may give written notice of at least five (5) calendar days to the Contractor and Contractor's sureties that if the defaults are not remedied within a time specified in such notice, the Contractor's control over the work will be terminated.

If the Contractor should be adjudged bankrupt, or make an assignment for the benefit of Contractor's creditors, or if a receiver should be appointed on account of Contractor's insolvency, the County may declare the Contractor's control over the work terminated, and so notify the Contractor and Contractor's sureties.

Upon such termination, the County may take possession, and use all or any part, of the Contractor's materials, tools, equipment, and appliances upon the premises to complete the work; the County assuming responsibility for the final relinquishment of such equipment at the conclusion of the work, or sooner, at its option, in as good condition as when it was taken over, reasonable wear and tear excepted; and the County agrees to pay for such materials and the use of said equipment at a reasonable compensation.

Upon such termination or the County's declaration that the Contractor is in default, the County may direct the surety to complete, or cause to be completed, the Contract work, or the County may direct that all or any part of the work be completed by day labor, or by employment of other contractors on informal contracts, or both. If the County directs the surety to complete or cause to be completed,

the Contract work, Contractor's performance bond surety agrees to immediately undertake to complete or cause to be completed, all Contract work.

If the Contractor's control over the work is terminated as provided above, the Contractor is not entitled to receive any portion of the amount to be paid under the Contract until it is fully completed. After completion, if the unpaid balance exceeds the sum of the amount expended by the County in finishing the work, plus all damages sustained, or to be sustained, by the County, plus any unpaid claims on account of labor, materials, tools, equipment, or supplies contracted for by the Contractor for the work herein contemplated, the excess not otherwise required by these Contract Documents to be retained shall be paid the Contractor. If the sum so expended exceeds the unpaid balance, the Contractor and Contractor's surety are liable to the County for the amount of such excess. If the surety completes the Contract work as provided above, such surety shall be subrogated to money due under the Contract, and to money which shall become due in the course of completion by the surety. However, Contractor and Surety agree that any subrogation rights of surety are subordinate to and inferior to rights of County.

The County reserves the right to terminate the work for its convenience upon written notice to Contractor. In such event, the Contractor shall be paid its reasonable costs for that portion of the work performed to the date of termination, reasonable costs associated with demobilization, plus fifteen percent (15%) of all such costs for overhead and profit.

48) FINAL INSPECTION, FIELD ACCEPTANCE, AND ACCEPTANCE: The Contractor shall notify the Owner's Representative in writing of the completion of the work, and the architect, engineer or Construction Manager/designated County Inspector of record shall inspect the work. The Contractor, or Contractor's representatives, may be present at the inspection. The Contractor will be notified in writing of any defects or deficiencies to be remedied prior to final acceptance. Within ten (10) calendar days of such notification, the Contractor shall proceed to correct such defects or deficiencies. When notified that this work has been completed, the architect or engineer will again inspect the work to satisfy itself that all work has been done in accordance with the Contract Documents, and will issue a final acceptance letter, and will recommend to the County that they formally accept the work. Final acceptance by the County shall cause the commencement of guarantee periods. Within ten (10) days of final acceptance (approval by Board of Supervisors) of all work required by these Contract Documents, a Notice of Completion will be filed with the County Recorder of San Benito County.

49) CLEANING UP: Throughout the construction period, the Contractor shall keep the site of the work in a presentable and safe condition, dispose of any surplus materials, clean out all drainage ditches and structures, and repair any fences or other property damaged during the progress of the work, to the satisfaction of the Owner's Representative and County.

Upon completion of the work, and prior to requesting final inspection, the Contractor shall thoroughly clean the site of the work of all rubbish, excess material, and equipment, and all portions of the work shall be left in a neat and orderly condition. The final inspection will not be made until this has been accomplished.

If Contractor fails or refuses to fulfill these obligations to the County's satisfaction, County may, at its option, undertake these obligations, and withhold the cost of performing these obligations, plus an additional fee of twenty-five percent (25%) for administrative costs, from payments to Contractor.

50) COMPLIANCE WITH LAWS AND REGULATIONS: The Contractor shall keep itself fully informed of, and shall observe and comply with, and shall cause any and all persons, firms, or corporations employed by Contractor or under him, to observe and comply with all State and national laws, and County and municipal ordinances, regulations, orders, and decrees which in any manner

affect those engaged or employed in the work, or the materials used in the work, or which in any way affect the conduct of the work. Particular attention is called to the following:

A. HOURS OF LABOR - Eight (8) hours of labor shall constitute a legal days' work, and the Contractor or any subcontractor under him, in the performance of the Contract, shall not require more than eight (8) hours of labor in any calendar day, and forty (40) hours of labor in any calendar week, from any person employed by Contractor in the performance of the work under this Contract, except as permitted under the provisions of Section 1815 of the Labor Code of the State of California. The Contractor shall forfeit, as penalty to the County, twenty-five dollars (\$25.00) for each worker employed by Contractor or any subcontractor under Contractor in the performance of the Contract for each calendar day during which any workman is required or permitted to labor more than eight (8) hours and for each calendar week during which any workman is required or permitted to labor more than forty (40) hours, in violation of the provisions of such Labor Code.

No work other than overtime and shift work shall be done between the hours of 7:00PM and 7:00AM, except such work as is necessary for the proper care and protection of the work already performed or except in case of an emergency; excepting that overtime and/or shift work may be established by the Contractor with reasonable notice and the written permission of the Owner's Representative.

B. PREVAILING WAGE - Pursuant to Section 1770, and following, of the California Labor Code, the Contractor shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. A copy of the Prevailing Wage Scale is available at the following web site: http://www.dir.ca.gov/DLSR/statistics_research.html#PWD. Failure to pay such prevailing wages shall subject the employer to the penalties set forth in Labor Code Section 1775.

C. LABOR DISCRIMINATION - Contractor shall comply with Section 1735 of the Labor Code of the State of California, which prohibits discrimination in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, or sex of such persons.

D. APPRENTICES - Attention is directed to Section 1777.5 of the Labor Code of the State of California concerning employment of apprentices, and the Contractor is required to comply with the provisions of said Section.

E. TRAVEL AND SUBSISTENCE PAYMENTS - Attention is directed to the requirements of Section 1773.1 of the Labor Code of the State of California. The Contractor shall make travel and subsistence payments to each workman needed to complete the work in accordance with the requirements in said Section 1773.1.

F. WORKERS' COMPENSATION - Pursuant to the requirements of Section 1860 of the Labor Code, the Contractor is required to secure the payment of Workers' Compensation to Contractor's employees in accordance with the provisions of Section 3700 of the Labor Code.

Prior to the commencement of work, the Contractor shall sign and file with the Owner's Representative a certification in the following form:

"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."

Said certification is included in the Contract, and signature and return of the Contract as provided in Paragraph 16 of these General Conditions, "Signing of Contract," shall constitute signing and filing of the said certificate.

G. USE OF PESTICIDES - The Contractor shall comply with all rules and regulations of the Department of Food and Agriculture, the Department of Health, the Department of Industrial Relations, the County Integrated Pest Management (IPM) program, and all other agencies which govern the use of pesticides required in the performance of the work on the Contract.

Pesticides shall include, but shall not be limited to, herbicides, insecticides, fungicides, rodenticides, germicides, nematocides, bactericides, inhibitors, fumigants, defoliants, desiccants, soil sterilants, and repellents.

Any substance or mixture of substances intended for preventing, repelling, mitigating, or destroying weeds, insects, diseases, rodents, or nematodes, and any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant shall be considered a pesticide.

H. PAYROLL RECORDS - Attention is directed to Section 1776 of the California Labor Code, a portion of which is quoted below. Regulations implementing said Section 1776 are located in Section 16000, and Sections 16401 through 16403 of Title 8, California Code of Regulations. The Contractor shall be responsible for compliance by Contractor's subcontractors.

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

(a) The information contained in the payroll record is true and correct.

(b) The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project.

(2) The payroll records enumerated under subdivision (a) [of Labor Code Section 1776 (paragraph 50.H(1) above)] shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:

(a) 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.

(b) A certified copy of all payroll records enumerated in subdivision (a) [of Labor Code Section 1776 (paragraph 50.H(1) above)] shall be made available for inspection or furnished upon request to a representative of the body awarding the contract and the Division of Labor Standards Enforcement of the Department of Industrial Relations.

(c) A certified copy of all payroll records enumerated in subdivision (a) [of Labor Code Section 1776 (paragraph 50.H(1) above)] shall be made available upon request by the public for inspection of for copies thereof. However, a

request by the public shall be made through either the body awarding the contract or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (b)(2) [of Labor Code Section 1776 (paragraph 50.H(2)(b) above)], the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the contractor, subcontractors, and the entity through which the request was made. The public may not be given access to the records at the principal office of the contractor.

(3) Unless required to be furnished directly to the Labor Commissioner in accordance with paragraph (3) of subdivision (a) of Section 1771.4 [of the Labor Code], 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. The payroll records may consist of printouts or payroll data that are maintained as computer records, if the printouts contain the same information as the forms provided by the division and the printouts are verified in the manner specified in subdivision (a) [of Section 1771.4].

(4) A contractor or subcontractor shall file a certified copy of the records enumerated in subdivision (a) [of Labor Code Section 1776 (paragraph 50.H(1) above)] with the entity that requested the records within ten (10) days after receipt of a written request.

(5) Except as provided in subdivision (f) [of Labor Code Section 1776], any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body or the Division of Labor Standards Enforcement shall be marked or obliterated to prevent disclosure of an individual's name, address, and Social Security number. The name and address of the contractor awarded the contract or the subcontractor performing the contract shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a multiemployer Taft-Hartley trust fund (29 U.S.C. Sec. 186(c)(5)) that requests the records for the purpose of allocating contributions to participants shall be marked or obliterated only to prevent disclosure of an individual's full Social Security number, but shall provide the last four (4) digits of the Social Security number. Any copy of records made available for inspection by, or furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (29 U.S.C. Sec. 175a) shall be marked or obliterated only to prevent disclosure of an individual's Social Security number.

...

(6) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a) [of Labor Code Section 1776 (paragraph 50.H(1) above)], including the street address, city, and county, and shall, within five (5) working days provide a notice of a change of location and address.

(7) The contractor or subcontractor has ten (10) days in which to comply subsequent to receipt of a written notice requesting the records enumerated in subdivision (a) [of Labor Code Section 1776 (paragraph 50.H(1) above)]. In the event that the contractor or subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit one hundred dollars (\$100.00) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Labor Standards Enforcement, these penalties shall be withheld from

progress payments then due. A contractor is not subject to a penalty assessment pursuant to this section due to the failure of a subcontractor to comply with this section.

...

The penalties specified in subdivision (h) of Labor Code Section 1776 for noncompliance with the provisions of said Section 1776 may be deducted from any moneys due or which may become due to the Contractor.

I. REPORTING REQUIREMENTS AND SANCTIONS - Failure to deliver to County specific information, records, reports, certifications, or any other documents required for compliance with these Contract Documents shall be considered noncompliance.

Contractors found by the County to be in noncompliance are to be advised of the specific deficiencies and urged to make immediate corrections. They should also be advised that monetary deductions may be made for failure to effect corrections or delinquencies.

If the Contractor fails to correct a deficiency within fifteen (15) days after notification, a deduction may be made. In such cases, the deduction shall be ten percent (10%) of the estimated value of the work done during the month, except that the deduction will not exceed ten thousand dollars (\$10,000.00), nor be less than one thousand dollars (\$1,000.00), and shall be deducted from the next progress payment.

Deductions for noncompliance will be in addition to all other deductions provided for in this Contract, and will apply irrespective of the number of instances of noncompliance. Deductions may be made separately and additively for each estimate period in which a new deficiency appears. When all deficiencies for a period have been corrected, the deduction covering that period will be released on the next progress payment. Otherwise, the deduction will be retained.

51) RESPONSIBILITY OF THE CONTRACTOR: The Contractor shall do all of the work and furnish all labor, materials, tools, equipment, and appliances, except as otherwise herein expressly stipulated, necessary, or proper for performing and completing the work herein required, including any Change Order work, disputed work or extra work directed by the County or Owner's Representative, within the time specified.

If the Contractor discovers any discrepancies during the course of the work between the Contract Documents and conditions in the field, or any errors or omissions in the Contract Documents and conditions in the field, or any errors or omissions in the Contract drawings, specifications, or layout given by stakes, points, or instructions, it shall be the Contractor's duty to inform the Owner's Representative immediately, and the Owner's Representative shall promptly verify the same. Any work done after such discovery until authorized in writing by the Owner's Representative will be done at the Contractor's risk.

In no case shall the use of subcontractors in any way alter the position of the Contractor or Contractor's sureties with relation to this Contract. When a subcontractor is used, the responsibility for every portion of the work shall still remain with the Contractor.

The Contractor shall pay, when due, all valid claims of subcontractors, suppliers, and workmen with respect to the project.

The mention herein of any specific duty or responsibility imposed upon the Contractor shall not be construed as a limitation or restriction of any other responsibility or duty imposed upon the

Contractor by the Contract, said reference being made herein merely for the purpose of explaining the specific duty or responsibility.

52) INDEMNIFICATION:

A. CONTRACTOR'S PERFORMANCE: Contractor shall defend, indemnify, and save harmless County and Owner's Representative (including their inspectors, construction managers, project managers, trustees, officers, agents, members, employees, affiliates, consultants, subconsultants, and representatives), and each of them, of and from any and all claims, demands, suits, causes of action, damages, costs, expenses, attorneys' fees, losses, or liability, in law or in equity, of every kind and nature whatsoever arising out of, or in connection with, Contractor's operations to be performed under this Contract, including, but not limited to:

(1) Personal injury (including, but not limited to, bodily injury, emotional injury or distress, sickness, or disease) or death to persons, including, but not limited to, any employees or agents of Contractor, County, Owner's Representative, Construction Manager, or any subcontractor, or damage to property of anyone including the work itself (including loss of use thereof), caused or alleged to be caused in whole or in part by any negligent act or omission of Contractor, County, or Owner's Representative, or anyone directly or indirectly employed by them, or anyone for whose acts they may be liable;

(2) Penalties threatened, sought, or imposed on account of the violation of any law, order, citation, rule, regulation, standard, ordinance, or statute, caused by the action or inaction of Contractor;

(3) Alleged infringement of any patent rights which may be brought arising out of Contractor's work;

(4) Claims and liens for labor performed or materials used or furnished to be used on the job, including all incidental or consequential damages from such claims or liens;

(5) Contractor's failure to fulfill any of the covenants set forth in these Contract Documents;

(6) Failure of Contractor to comply with the provisions of the Contract Documents relating to insurance; and,

(7) Any violation or infraction by Contractor of any law, order, citation, rule, regulation, standard, ordinance, or statute in any way relating to the occupational, health, or safety of employees.

The indemnities set forth in this section shall not be limited by the insurance requirements set forth in these Contract Documents.

Contractor's indemnification of County will not include indemnification for claims which arise as the result of the active negligence of County, or the sole negligence or willful misconduct of County, its agents, employees or independent contractors who are directly responsible to County, or for defects in design furnished by such persons.

53) PERMITS AND LICENSES: The Contractor shall procure all permits and licenses necessary for the normal conduct of its business and construction operations, and all costs associated therewith shall be paid by Contractor.

The Environmental Quality Act of 1970 may be applicable to permits, licenses, and other authorizations which the Contractor must obtain from local agencies in connection with performing the work of the Contract. The Contractor shall comply with the provisions of said statutes in obtaining such permits, licenses, and other authorizations, and they shall be obtained in sufficient time to prevent delays to the work.

In the event that the County has obtained permits, licenses, or other authorizations applicable to the work in conformance with the requirements in said Environmental Quality Act of 1970, the Contractor shall comply with the provisions of said permits, licenses, and other authorizations.

54) PROTECTION OF COUNTY AGAINST PATENT CLAIMS: The Contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the work.

55) PROTECTION OF WORKERS: The Contractor shall conform to the rules and regulations pertaining to safety established by the California Division of Industrial Safety and any other governing body having jurisdiction over the work. The Contractor shall immediately replace or repair any unsafe ladder, scaffolding, shoring, or bracing, or correct any other dangerous or hazardous situation that may exist or that the Owner's Representative may indicate. Failure of the Owner's Representative to suspend the work or notify the Contractor of the inadequacy of the safety precautions or noncompliance with the law shall not relieve the Contractor of this responsibility.

The Contractor is warned that when the work involves existing sewers and appurtenances that have been exposed to sewage and industrial wastes, these facilities shall be considered contaminated with disease-causing organisms. Personnel in contact with contaminated facilities, debris, waste water, or similar items shall be advised by the Contractor of the necessary precautions that must be taken to avoid becoming diseased. It is the Contractor's responsibility to urge his/her personnel to observe a strict regimen of proper hygienic precautions, including any inoculations recommended by the local public health officer.

Because of the potential danger of solvents, gasoline, and other hazardous material in the existing sewers and storm drain pipes, these areas shall be considered hazardous. The Contractor shall be aware of these dangers and shall comply with Article 108, "Confined Spaces," of the General Industrial Safety Orders contained in Title 8 of the California Code of Regulations.

In the event that this Contract requires the excavation of any trench or trenches in excess of five (5) feet in depth, Contractor shall prepare a detailed design plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trenches. Said detailed design plan and subsequent excavating operations shall fully comply with all local, state and federal regulations including, but not limited to, the Construction Safety Orders, Section 1539, Permits and Section 1540 et seq., Excavation.

A. Safety Program. When requested by County, Contractor shall submit a proposed safety program which outlines the precautions to be taken by contractor to insure the safety of County employees and the public.

B. Material Safety Data Sheets.

(1) Contractor shall provide the County with copies of current Material Safety Data Sheets (MSDS) on all products subject to the requirements of Title 8, California Code of Regulations Section 5144. The MSDS submittals will be required prior to the issue of a Notice to Proceed.

(2) Contractor shall conduct operations in such a way as to comply with manufacturers' recommendations contained in Material Safety Data Sheets.

56) PROTECTION OF MATERIALS AND EQUIPMENT: The Contractor shall protect the work, materials, and equipment from damage due to the nature of the work, the action of the elements, trespassers, or other causes. The Contractor shall properly store materials and equipment, and erect such temporary structures as are required to protect them from damage, including, but not limited to, construction fencing.

57) SANITARY PROVISIONS: The necessary sanitary conveniences for the use of the workers on the project, properly obscured from public observance, shall be constructed and maintained by the Contractor.

58) EXISTING UTILITIES: It is recognized by the Contractor that the location of existing utility facilities as shown on Contract drawings and specifications are approximate; their exact location is unknown.

Recognition is given to the fact that there may be additional utilities existing on the property unknown to either party to the Contract. Location of utilities as shown on drawings and specifications represent the best information obtainable from utility maps and other information furnished by the various agencies involved. The County warrants neither the accuracy nor the extent of actual installations as shown on the drawings and specifications.

Because of this uncertainty, it may become necessary for the Owner's Representative to make adjustments in the line or grade of sewers or storm drains. Installation of such adjusted lines shall be made at the regular unit price bid for the work, and no additional compensation will be paid therefor, unless the scope and character of the work has been changed.

The Contractor agrees and is required to coordinate and fully cooperate with the County and utility owners for the location, relocation, and protection of services and utilities. The Contractor's attention is directed to the existence of services and utilities, underground and overhead, necessary for normal house and commercial service for all buildings along the line of work. The Contractor shall make arrangements with utility owners and Underground Service Alert (USA) for the location of all service or utility lines in advance of the actual construction and for the relocation of such facilities, if necessary, by the utility owner or the Contractor.

In accordance with Section 4215 of the Government Code of the State of California, the County shall make provisions to compensate the Contractor for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating such main and trunk line utility facilities not indicated in the plans and specifications with reasonable accuracy, and for equipment on the project necessarily idled during such work. Compensation will be in accordance with Paragraph 39, Changes, and subject to all of the requirements of Paragraph 37, Claims, of the General Conditions. In the event the Contractor discovers utilities not identified in the Contract Documents, the Contractor shall immediately notify the Owner's Representative and the utility owner by the most expeditious means available and later confirm in writing.

It is understood and agreed that the failure of the Contractor or its subcontractor to comply fully with these provisions constitutes failure of the Contractor to exercise reasonable care and precludes Contractor's recovery from County for any related costs or damages.

59) COOPERATION WITH OTHERS: The County or adjacent property owner may perform other work adjacent to or within the project area, concurrent with the Contractor's operations. The Contractor shall cooperate fully with County in all operations which coincide with other work being performed, and provide County with such scheduling and other information as may be required by

County to perform such other work. The Contractor shall conduct operations to minimize interference with the work of other forces or contractors performing such work. This work performed by a second contractor may include work which is incomplete or in dispute with the Contractor.

Any disputes or conflicts which may arise between the Contractor and any other forces or contractors retained by the County, causing delays or hindrance to each other, shall be referred to the Owner's Representative for resolution.

If the work of the Contractor is delayed because of any acts or omissions of any other forces or contractor, the Contractor shall on that account have no claim against the County other than for an extension of time.

60) AIR POLLUTION CONTROL: The Contractor shall comply with all air pollution control rules, regulations, ordinances, and statutes which apply to any work performed pursuant to the Contract, including any air pollution control rules, regulations, ordinances, and statutes specified in Section 11017 of the Government Code.

Unless otherwise provided in the Contract Documents, material to be disposed of shall not be burned.

61) WATER POLLUTION: The Contractor shall comply with all rules, regulations, ordinances, and statutes which apply to water pollution, including but not limited to, erosion control and Section 7-1.G of the State specifications.

62) SOUND CONTROL REQUIREMENTS: The Contractor shall comply with all sound control and noise level rules, regulations, and ordinances which apply to any work performed pursuant to the Contract.

Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler.

63) UNFAVORABLE WEATHER AND OTHER CONDITIONS: During unfavorable weather and other conditions, the Contractor shall pursue only such portions of the work as will not be damaged thereby. No portions of the work the satisfactory quality or efficiency of which will be affected by any unfavorable conditions shall be constructed while these conditions remain, unless, by special means or precautions acceptable to the Owner's Representative, the Contractor shall be able to overcome these conditions.

64) WEEKEND, HOLIDAY, AND NIGHT WORK: No work shall be done between the hours of 7:00PM and 7:00AM, or on Sundays or legal holidays, except with written permission of the County and Owner's Representative. Requests to work between 7:00PM and 7:00AM, or on Sundays or legal holidays, must be submitted in writing at least two (2) working days in advance of the intended work. In case of an emergency, the Contractor will be allowed to work at night or on Sundays or legal holidays, but must notify the Owner's Representative immediately. An emergency shall be considered an unforeseen event that poses a danger to the public or to the uncompleted work.

It is understood, however, that two (2) or three (3) shift operations may be established as a regular procedure by the Contractor if Contractor first obtains written permission from the County and Owner's Representative. Such permission may be revoked by the County or Owner's Representative at any time, without cause, or if the Contractor fails to maintain adequate force and equipment for reasonable prosecution and to justify inspection of the work, or fails to provide sufficient artificial light to permit the work to be carried on properly and safely and to permit proper inspection.

The Contractor shall give the County and Owner's Representative two (2) working days prior written notice of any work to be done on a Saturday, with the location and type of work to be done specified; and any work done without such notice and without the supervision of an inspector may be ordered removed and replaced at the Contractor's expense.

65) OVERLOADING: The Contractor shall determine safe loading capacities and shall not overload any structure beyond its safe capacity during construction. In addition to assuming full responsibility for bodily injury resulting from any such overloading, the Contractor shall repair to the Owner's Representative's satisfaction or reimburse the County for the costs of repairing damage resulting therefrom.

66) SUBCONTRACTING AND ASSIGNMENT: The performance of the Contract may not be assigned except upon written consent of the County, and no assignment shall be permitted which would relieve the original Contractor or Contractor's surety of their responsibilities under the Contract.

67) NON-RECOGNITION OF SUBCONTRACTORS: No subcontractor will be recognized as such, and all persons engaged in the work under this Contract will be considered as employees of the Contractor, and their work shall be subject to all the provisions of the Contract. The County and its representatives will deal only with the Contractor, who shall be responsible for the proper performance of the entire work. Except as otherwise provided in the Contract Documents, or when direct communications have been specifically authorized, the County and Contractor shall communicate through Owner's Representative. Communications by Contractor with the County's consultants and architect or engineer's consultants shall be through the Owner's Representative. Communications by the Owner's Representative with subcontractors shall be through the Contractor.

68) LANDS AND RIGHTS OF WAY: The County shall provide the lands, rights of way, and easements upon which the work under this Contract is to be done, and such other lands as may be designated on the Contract drawings for the use of the Contractor, and the Contractor shall confine Contractor's operations to within these limits.

The Contractor shall provide, at Contractor's own expense, any additional land and access thereto that may be required for temporary construction facilities or storage of materials.

69) LIABILITY OF COUNTY OFFICIALS: Neither the Owner's Representative, nor officers, employees, agents, or representatives of the County, nor any of them, shall be responsible for any liability arising under this Contract, except such obligations as are specifically set forth herein.

70) CONTRACTOR NOT AN AGENT OF THE COUNTY: The right of general supervision shall not make the Contractor an agent of the County, and the liability of the Contractor for all damages to persons or to public or private property arising from the performance of the work shall not be lessened because of such general supervision.

71) THIRD-PARTY CLAIMS: The Contractor shall be responsible for all third-party claims, and for costs or injuries incurred by a third party which result from the operations of the Contractor, or its performance under the Contract.

72) GUARANTEE: Should any failure of the work occur within a period of one year after recordation of the notice of completion of the project or portions thereof or within any designated warranty period, which can be attributed to faulty materials, poor workmanship, or defective equipment, the Contractor shall promptly make the needed repairs at Contractor's expense.

The County is hereby authorized to make such repairs if the Contractor fails to make or undertake with due diligence the aforesaid repairs within ten (10) days after Contractor is given written notice of such failure and without notice to the surety provided, however, that in case of emergency

where, in the opinion of the County, delay would cause serious loss or damages, or a serious hazard to the public, the repairs may be made or lights, signs, and barricades erected, without prior notice to the Contractor or surety, and the Contractor shall pay the entire costs thereof.

73) ASSIGNMENT OF ANTITRUST ACTIONS: Pursuant to Section 4552 of the Government Code of the State of California, the following provisions shall be a part of this Contract:

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

74) LEGAL ADDRESS OF THE CONTRACTOR: Both the address given in the Bid and the Contractor's office in the vicinity of the work are hereby designated as places to either of which drawings, letters, notices, or other articles or communications to the Contractor may be mailed, transmitted electronically or delivered. The mailing, electronic transmission, or delivery to either of these places shall be deemed sufficient notice thereof upon the Contractor. Nothing herein contained shall be deemed to preclude the service of any drawing, letter, notice, article, or communication to, or upon, the Contractor or Contractor's representative personally. The address named in the Bid may be changed at any time by written notice from the Contractor to the Owner's Representative.

75) SURVEYS: When set forth in the Contract Documents that the Contractor is to provide all staking and engineering services, the Contractor shall be responsible to do all necessary staking and engineering services to layout and control the work to the elevations, lines, and dimensions shown on the plans. Any deviations must receive prior written acceptance of the Owner's Representative. All staking and engineering services affecting the line or elevation of underground drainage, sewers, or utilities, and all other work within public rights of way or easements shall be performed by or under the direction and supervision of a Registered Civil Engineer or Licensed Land Surveyor, licensed by the state of California.

The Contractor shall keep the Owner's Representative informed, at least two (2) working days in advance, of the times and places at which Contractor will need lines, elevations, and reference points. Unless authorized by the Owner's Representative, any work done without line and grade will be done at the Contractor's risk. The Contractor shall be responsible for the accuracy of Contractor's own layout work, and shall be liable for the preservation of all established lines and grades. Stakes damaged or destroyed by the operations of the Contractor will be replaced at Contractor's expense.

76) MATERIALS OR EQUIPMENT SPECIFIED BY NAME: When any materials or equipment is indicated or specified by patent or proprietary name or by the name and catalogue number of the manufacturer, it shall be considered as used for convenience in describing the material or equipment desired. The use of an alternative material or equipment which is of equal quality and of the required characteristics for the purpose intended may be permitted. Request for such substitution shall be made in writing by the Contractor within thirty (30) days of the Notice to Proceed. Failure by the Contractor to request substitution within thirty (30) days of the Notice to Proceed constitutes an agreement by Contractor to furnish only the materials or equipment listed in the Contract Documents. Until and unless such substitutions are accepted by the Owner's Representative, no deviations from the specifications shall be allowed. The burden of proof as to the quality and suitability of the alternative shall be upon the Contractor. The County shall be the sole judge as to the quality and suitability of alternative materials or equipment, and its decision shall be final.

77) PROPERTY RIGHTS IN MATERIAL: Nothing in this Contract shall be construed as vesting in the Contractor any right of property in the materials used, after they have been installed, attached, or affixed to the work, but all such materials shall be the property of the Contractor and the County jointly as their interest may appear, and cannot be removed from the work without the consent of the County.

78) CONTRACTOR'S EQUIPMENT: The Contractor shall provide adequate and suitable equipment and means of construction to meet all the requirements of the work, including completion within the time allotted. Only equipment suitable to produce the quality of work required will be permitted to operate on the project, and specific types of equipment may be requested on component parts of the work.

In any case where the use of a particular type or piece of equipment has been banned, or in cases where the Owner's Representative has condemned for use on the work, any piece or pieces of equipment, the Contractor shall promptly remove such equipment from the site of the work. Failure to do so within a reasonable time may be considered a breach of contract.

79) MISCELLANEOUS PROVISIONS: This Contract shall bind and inure to the heirs, devisees, assignees, and successors in interest of Contractor, and to the successors in interest of County, in the same manner as if such parties had been expressly named herein.

If any claim or dispute arises between the parties, the claim or dispute shall first be submitted to mediation utilizing the services of a neutral mediator. If the parties cannot agree upon the selection of a neutral mediator, the matter shall be submitted to Judicial Arbitration and Mediation Services for the selection of a neutral mediator. The parties shall share equally the costs associated with the mediation.

This Contract shall be governed by the laws of the State of California.

If any one or more of the provisions contained in the Contract should be invalid, illegal, or unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions contained herein shall not in any way be affected or impaired thereby.

This Contract constitutes the full and complete understanding of the parties, and supersedes any previous agreements or understandings, oral or written, with respect to the subject matter hereof. The Contract may only be modified by a written instrument signed by both parties.

Contractor hereby assigns to County all its first-tier subcontracts now or hereafter entered into by Contractor for performance of any part of the work. The assignment will be effective upon acceptance by County in writing, and only as to those subcontracts which County designates in writing. Such assignment is part of the consideration to County for entering into the Contract with Contractor, and may not be withdrawn.

80) PUBLIC CONTRACT CODE SECTION 20104, ET SEQ.:

Public Contract Code section 20104, et seq., requires that the following language be set forth in the specifications:

§ 20104 Application of article; provisions included in plans and specifications

(a) (1) This article applies to all public works claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between a contractor and a local agency.

(2) This article shall not apply to any claims resulting from a contract between a contractor and a public agency when the public agency has elected to resolve any disputes pursuant to Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2 [of the Public Contract Code].

(b) (1) "Public work" means "public works contract" as defined in Section 1101 [of the Public Contract Code], but does not include any work or improvement contracted for by the state or the Regents of the University of California.

(2) "Claim" means a separate demand by the contractor for (A) a time extension, (B) payment of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (C) an amount the payment of which is disputed by the local agency.

(c) The provisions of this article or a summary thereof shall be set forth in the plans or specification for any work which may give rise to a claim under this article.

(d) This article applies only to contracts entered into on or after January 1, 1991.

§ 20104.2. Claims; requirements; tort claims excluded

For any claim subject to this article, the following requirements apply:

(a) The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

(b) (1) For claims of less than fifty thousand dollars (\$50,000), the local agency shall respond in writing to any written claim within 45 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

(c) (1) For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the local agency shall respond in writing to all written claims within 60 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 30 days after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater.

(d) If the claimant disputes the local agency's written response, or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency, in writing, either within 15 days of receipt of the local agency's response or within 15 days of the local agency's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the local agency shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(e) Following the meet and confer conference, if the claim or any portion remains in dispute, the claimant may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

(f) This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.

§ 20104.4. Civil action procedures; mediation and arbitration; trial de novo; witnesses

The following procedures are established for all civil actions filed to resolve claims subject to this article:

(a) Within 60 days, but no earlier than 30 days, following the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

(b) (1) If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act (Title 4 (commencing with Section 2016.010) of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

(2) Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

(3) In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees of the other party arising out of the trial de novo.

(4) The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process.

§ 20104.6. Payment on undisputed portion of claim; interest on arbitration awards or judgments

(a) No local agency shall fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.

(b) In any suit filed under Section 20104.4 [of the Public Contract Code], the local agency shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the suit is filed in a court of law.

SUPPLEMENTAL CONDITIONS

1) **TIME OF COMPLETION.** The Contractor shall complete all or any designated portions of the work called for under the contract in all parts and requirements within 150 calendar days (except as modified in the technical specifications). The contractor shall submit a time line for construction within ten (10) working days upon award of the contract. Contract time shall begin five (5) days after the date of dispatch of the Notice to Proceed.

It is the intent of the County to minimize disruptions to ongoing County operations during construction projects. A total of 150 calendar days have been allowed for this project.

The bidding and construction schedule for this project is as follows:

February 19, 2020 – March 18, 2020	Bidding Period
February 26 & March 4, 2020 @ 11AM	Mandatory Job Walks
March 18, 2020 @ 2:00pm	Bid Opening
March 25, 2020	Construction Award (Anticipated)
April 8, 2020 (BOS Meeting April 7, 2020)	Construction Notice to Proceed (Anticipated)
April 8, 2020 – September 15, 2020	Construction period (Anticipated)

For the purpose of computing liquidated damages all days in excess of the allowed number of construction days, that the contract is in the construction phase, shall be considered in excess of the allowed number of calendar days for the overall project.

2) **LIQUIDATED DAMAGES.** Time is of the essence in this contract. It is agreed by the parties to the contract that in case all the work called for under the contract in all parts and requirements is not finished or completed within the number of calendar days as set forth in the Special Conditions, damage will be sustained by the County, and that it is and will be impracticable and extremely difficult to ascertain and determine the actual damage which the County will sustain in the event of and by reason of such delay; and it is therefore agreed that the Contractor will pay to the County the sum set forth below per day for each and every calendar day's delay in finishing the work in excess of the number of calendar days prescribed; and the Contractor agrees to pay said liquidated damages herein provided for, and further agrees that the County may deduct the amount thereof from any moneys due or that may become due the Contractor under the contract.

If adverse weather conditions are the basis for a Claim for additional time, such claim shall be documented by data substantiating that weather conditions were abnormal for the period of time and could not have been reasonably anticipated and that weather conditions had an adverse effect on the critical path schedule.

Claims due to adverse weather, when approved, shall be excusable but not compensable.

It is further agreed that in the event the Contractor fails to complete work and all requirements under this Agreement within the number of calendar days specified, the County shall have the right (but not the obligation) to increase the number of calendar days, as the County may in its sole discretion deem best to serve its interests.

The Contractor will be granted an extension of time and will not be assessed with liquidated damages for any portion of the delay in completion of the work beyond the time named in the Special Conditions for the completion of the work caused by acts of God or of the public enemy, fire, storms, floods, tidal waves, earthquakes, shortage of materials and freight embargoes, provided that the Contractor shall notify the Engineer in writing of the causes of delay within fifteen (15) days from the beginning of any

such delay. The Engineer shall ascertain the facts and the extent of the delay, and his findings thereon shall be final and conclusive.

The Contractor shall pay to the County of San Benito a sum of five hundred dollars (\$500) per day for each and every calendar day's delay in finishing the work in excess of the number of calendar days prescribed in the Time of Completion. Completion of the project includes correction of any punch list items identified by the Project Design Team.

3) FACILITIES WITH ASBESTOS CONTAINING MATERIALS The County of San Benito has conducted limited surveys of its facilities to determine the presence of Asbestos Containing Materials (ACM).

The contractor shall be responsible for ensuring that any subcontractors, workmen, or others associated with the work on this project have been notified of the presence of asbestos containing materials at the construction site if known, and have been properly instructed to approach all work with caution. If during the course of construction, materials are discovered that are suspected to contain ACM, the contractor shall stop work and notify the County project manager immediately. Within one (1) week of the project manager's notification to the Occupational Safety and Health Division (OSH) of the County, material will be sampled and the results posted at the construction site. Construction shall not resume until approval to proceed has been obtained from OSH. The time accrued during the period when the contractor first notifies the County of a bona fide suspicion that a project area contains ACM until the time when construction is allowed to proceed, shall not count towards the required time of completion as indicated in Section 1 of the Supplemental Conditions, provided the contractor is unable to perform work as specified during the delay and all other provisions of the specifications.

The contractor shall be responsible for informing all subcontractors, workmen or other persons associated with the project of the contents of this notification letter and any special safety precautions to be taken. If no notification letter is attached, then either the building area has not been surveyed or no ACM have been detected in areas sampled. The contractor shall bring any questions or concerns regarding ACM to the immediate attention of the County project manager.

Asbestos notification letters are included in these Invitation for Bid documents for any ACM previously discovered in the area of construction. The asbestos notification letter identifies areas that have been surveyed for asbestos. However, it should be noted that the surveys conducted are not comprehensive wall-to-wall surveys. Any materials not surveyed and noted within the letters may be suspect to contain asbestos.

Under no circumstances shall a contractor remove asbestos on County facilities, unless that contractor is properly licensed and has been specifically hired by the County for the sole purpose of asbestos abatement as directed by the County's Occupational Safety & Health Division.

4) SAFETY REQUIREMENTS ON ALL COUNTY PROJECTS All General or Prime Contractors will be responsible for their Employees, and subcontractors. It will be up to them to enforce all safety regulations set forth by the County and Cal-OSHA. This will include all safety ware and equipment necessary to provide a safe work environment for all workers and the public in and around the job site.

1. The use of safety ware and equipment, such as eye protection, ear protection, and other required safety equipment would be strictly enforced.
2. Work areas will be marked off and safe paths provided for county employees and the general public.
3. Noise and dust will need to be contained and kept to a minimum when working in occupied areas, and may require after hours work.

4. When work above the floor or ground is required, proper use of ladders and safety harness or railing will be enforced.
5. All welding, cutting or brazing will require a fire-watch with a fire extinguisher.
6. All Contractors are responsible for their equipment and must ensure that it is safe and in good working order. All electrical equipment to be used on site will be checked by the Project Manager.
7. All Contractors are required to clean up their work area daily. Materials not used will be stored neatly or removed from the site.
8. Material Safety Data Sheets for any materials used on the project are required per OSHA standards. **No storage or disposal of hazardous materials on site is allowed.**
9. For any work site/facility that is equipped with a security system, or that has doors that must remain locked, the entering of this site/facility or shutdown of the security system will need to be authorized by the Project Manager and/or the Building Maintenance Superintendent.
10. The Project Manager will explain all policies and procedures regarding emergency alarms and exits and will also give a tour of the fire exits.
11. A dress code is required within the county facilities. Work attire will be neat and clean, and will meet OSHA requirements. No t-shirts, shorts, or open-toed shoes will be permitted.
12. The County of San Benito has all non-smoking facilities. Smoking is permitted only in designated areas outside of work site.

5) CLAYTON ACT / CARTWRIGHT ACT In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the contractor or subcontractor offers and agrees to assign to the awarding body 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. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the contractor, without further acknowledgment by the parties.

6) TRENCHING / EXCAVATIONS On any public works contract of a local public entity which involves digging trenches or other excavations that extend deeper than four feet below the surface (a) the contractor shall promptly, and before the following conditions are disturbed, notify the local public entity, in writing, of any:

- (1) Material that the contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.
- (2) Subsurface or latent physical conditions at the site differing from those indicated by information about the site made available to bidders prior to the deadline for submitting bids.
- (3) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

(b) That the local public entity shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the contractor's cost of, or the time required for, performance of any part of the work shall issue a change order under the procedures described in the contract.

(c) That, in the event that a dispute arises between the local public entity and the contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the contractor's cost of, or time required for, performance of any part of the work, the contractor shall not be excused from 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.

(7) TRENCHING / EXCAVATIONS (PCC 6705) No contract for public works involving an estimated expenditure in excess of twenty-five thousand dollars (\$25,000), for the excavation of any

trench or trenches five feet or more in depth, shall be awarded unless it contains a clause requiring submission by the contractor and acceptance by the awarding body or by a registered civil or structural engineer, employed by the awarding body, to whom authority to accept has been delegated, in advance of excavation, of a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the shoring system standards, the plan shall be prepared by a registered civil or structural engineer.

Nothing in this section shall be deemed to allow the use of a shoring, sloping, or protective system less effective than that required by the Construction Safety Orders.

Nothing in this section shall be construed to impose tort liability on the awarding body or any of its employees.

The terms public works and awarding body, as used in this section, shall have the same meaning as in Sections 1720 and 1722, respectively, of the Labor Code.



COUNTY OF SAN BENITO
STATE OF CALIFORNIA

THIS CONTRACT, made and entered into this ____ day of _____, 20 between County of San Benito, a political subdivision of the State of California, hereinafter referred to as County, and _____, hereinafter referred to as Contractor;

WHEREAS, the San Benito County Board of Supervisors caused plans and specifications for the work hereinafter mentioned to be prepared, and approved and adopted the plans and specifications; and

WHEREAS, the San Benito County Board of Supervisors caused to be noticed for the time and in the manner required by law a Notice inviting sealed Bids for the performance of the work described in the adopted plans and specifications; and

WHEREAS, Contractor, in response to the Notice, submitted a sealed Bid for the performance of the work specified in the adopted plans and specifications to the San Benito County Board of Supervisors within the time and in the manner specified in the Notice; and

WHEREAS, in the manner provided by law, the San Benito County Board of Supervisors received, publicly opened and canvassed the Bids submitted in response to the Notice, including the Bid submitted by Contractor; and

WHEREAS, Contractor was the lowest responsive, responsible Bidder for the performance of said work, and the San Benito County Board of Supervisors, as a result of the canvass of Bids submitted, determined and declared Contractor to be the lowest responsive, responsible Bidder for the work and awarded to it a contract therefore.

NOW, THEREFORE, in consideration of the above, it is mutually agreed between the parties hereto as follows:

1. The CONTRACTOR will commence and complete the construction of the following public work project:

HOMELESS SERVICES CENTER – PHASE III #PWB-2001

2. The CONTRACTOR shall do all of the work and furnish all of the materials, supplies, tools, equipment, labor, and other services necessary to construct and complete in a good, workmanlike and substantial manner and to the COUNTY'S satisfaction, the project as described in the Invitation for Bids package, including all of the CONTRACT DOCUMENTS.
3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within 5 calendar days after the date of the Notice To Proceed and will complete the same within 60 calendar days unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.
4. The CONTRACTOR agrees to perform all of the work described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of _____ (\$_____).

5. The term "CONTRACT DOCUMENTS" means and includes the following, all of which documents are incorporated herein by reference:
- a. INVITATION FOR BIDS "THE BID PACKAGE" INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
 - (1) INVITATION FOR BIDS
 - (2) CONTRACTING AND PROCUREMENT REQUIREMENTS INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
 - (a) NOTICE TO CONTRACTORS
 - (b) INSTRUCTIONS TO BIDDERS
 - (c) GENERAL CONDITIONS
 - (d) SUPPLEMENTAL CONDITIONS
 - (3) SPECIFICATIONS AND REQUIREMENTS
 - (4) PLANS
 - (5) ADDENDA:
 - No. _____, dated _____, 20_____
 - No. _____, dated _____, 20_____
 - b. THE ACCEPTED BID INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
 - (1) SIGNATURE SHEET
 - (2) BID SCHEDULE
 - (3) NAMES AND TITLES FORM
 - (4) BIDDER'S BOND
 - (5) REFERENCE LIST
 - (6) SUBCONTRACTOR LIST
 - (7) NON-COLLUSION AFFIDAVIT
 - (8) STATEMENT OF COMPLIANCE
 - (9) BIDDER QUALIFICATIONS
 - (10) GUARANTY
 - (11) CERTIFICATE AS TO WORKER'S COMPENSATION
 - (12) AFFIDAVIT CONCERNING EMPLOYMENT OF UNDOCUMENTED ALIENS
 - c. NOTICE OF AWARD
 - d. CONTRACT, SIGNED BY THE COUNTY AND THE CONTRACTOR

- e. PERFORMANCE BOND
- f. PAYMENT BOND
- g. NOTICE TO PROCEED
- h. FUTURE CHANGE ORDERS

All CONTRACT DOCUMENTS are intended to cooperate, so that any work called for in one and not mentioned in another is to be executed the same as if mentioned in all. However, should there be any conflict between the terms of this instrument and the CONTRACTOR'S Bid, then this instrument shall control. It is further expressly agreed by and between the parties hereto that should there be any conflict between the terms of this instrument and the CONTRACTOR'S Bid, then this instrument shall control and nothing herein shall be considered as an acceptance of the said terms of the Bid conflicting herewith. Where the specific terms and conditions in any of the referenced CONTRACT DOCUMENTS conflict with general terms and conditions in any referenced CONTRACT DOCUMENTS, the more specific terms and conditions shall be deemed to control. However, the general terms and conditions in any referenced CONTRACT DOCUMENTS shall remain in full force and effect, to the extent they do not conflict with the specific terms and conditions in any referenced CONTRACT DOCUMENTS.

- 6. The COUNTY will pay to the CONTRACTOR in the manner and at such times set forth in the CONTRACT DOCUMENTS such amounts as required by the CONTRACT DOCUMENTS.
- 7. In lieu of the COUNTY retaining a portion of progress payments due the CONTRACTOR, the CONTRACTOR may elect to deposit qualifying securities equivalent to the amount to be withheld. Upon such deposit under an escrow agreement substantially in the form specified in section 22300(e) of the Public Contracts Code, the funds shall be released.
- 8. Eight (8) hours of labor shall constitute a legal day's work, and the CONTRACTOR or any subcontractor under him, in the performance of the contract, shall not require more than eight (8) hours of labor in any calendar day, or more than forty (40) hours of labor in any calendar week, from any person employed by the CONTRACTOR in the performance of the work under this Contract, except as permitted under the provisions of Section 1815 of the Labor Code of the State of California. The CONTRACTOR shall forfeit, as penalty to the County, twenty-five dollars (\$25.00) for each worker employed by the CONTRACTOR or any subcontractor under the CONTRACTOR in the performance of the contract for each calendar day during which any worker is required or permitted to labor more than eight (8) hours and for each calendar week during which any worker is required or permitted to labor more than forty (40) hours, in violation of the provisions of such Labor Code.
- 9. The Contractor and subcontractors shall comply with the requirements of Labor Code sections 1777.5 and 1777.6 in the employment of apprentices. Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations ex officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.
- 10. Pursuant to Section 1770 et seq. of the California Labor Code, the CONTRACTOR shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. The statement of prevailing wages appearing in the General Prevailing Wage Rates, as established by the California Department of Industrial Relations, is hereby specifically referred to and by this reference is made a part of this contract. Copies of the Prevailing Wage Scale are available at the following website: http://www.dir.ca.gov/DLSR/statistics_research.html#PWD. Those copies shall be made available to any interested party upon request. Failure to pay such prevailing wages shall subject the employer to the penalties set forth in Labor Code section 1775. The difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which the worker was paid less than the prevailing wage rate shall be paid to each worker by the

CONTRACTOR or subcontractor. An error on the part of the COUNTY does not relieve the CONTRACTOR or any subcontractor from responsibility for payment of the prevailing rate of per diem wages and penalties pursuant to Labor Code sections 1770 through 1775.

11. The CONTRACTOR and each subcontractor must keep accurate payroll records of employees on public contracts and certify these records upon request, pursuant to Section 1776 of the California Labor Code and implementing regulations set forth in Title 8, Division 1, Chapter 8, Subchapter 3, sections 16000 and 16400 through 16404 of the California Code of Regulations. Payroll records must be made available for inspection by employees, the County, and the Division of Labor Standards Enforcement. The CONTRACTOR shall be responsible for compliance by the CONTRACTOR'S subcontractors.
12. The CONTRACTOR shall be subject to the examination and audit of the State auditor, at the request of the County or as part of any audit of the County, for a period of three (3) years after final payment under the contract.
13. During the performance of this Contract, Contractor agrees as follows:
 - a. During the performance of this Contract, Contractor and its subcontractors shall not unlawfully discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical disability, medical condition (cancer related), marital status, pregnancy, age (over 18), sex, sexual orientation, veteran's status or any other non-merit factor unrelated to job duties. Contractor and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause.
 - b. The Contractor shall, in all solicitations or advertisements for employees by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, ancestry, physical or mental disability, medical condition (cancer related), marital status, pregnancy, sex, sexual orientation, age (over 18), veteran status, or any other non-merit factor unrelated to job duties.
 - c. The Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under this Contract.
14. The CONTRACTOR 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. Section 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the California Business and Professions Code), arising from purchases of goods, services, or materials pursuant to this CONTRACT. This assignment shall be made and become effective at the time the COUNTY tenders final payment to the CONTRACTOR, without further acknowledgment by the parties.
15. This CONTRACT shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

16. The following individuals are the parties CONTRACT Administrators:

COUNTY'S Contract Administrator:

Name: Harry Mavrogenes
Title: RMA Director
Address: 2301 Technology Parkway
Hollister, CA 95023
Phone: 831-636-4170
Fax: 831-636-4176
E-mail : lhmvavrogenes@cosb.us

CONTRACTOR'S Contract Administrator:

Name: _____
Title: _____
Address: _____

Phone: _____
Fax: _____
E-mail: _____

This CONTRACT shall not be effective unless and until approved by a duly authorized representative of County of San Benito and San Benito County Counsel.

IN WITNESS WHEREOF, County of San Benito and Contractor have caused this Agreement to be signed as of the day and year first above written.

CONTRACTOR (FIRM)

Date _____
Address: _____

Phone: _____
Fax: _____

COUNTY OF SAN BENITO

Date _____
Harry Mavrogenes, RMA Director

APPROVED AS TO LEGAL FORM:
San Benito County Counsel's Office

Date _____
Barbara Thompson, County Counsel



PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, THAT WHEREAS the County of San Benito, State of California, hereinafter designated as the "Obligee," has on _____, 20____, awarded to _____ hereinafter designated as "Principal," a contract for the construction of _____ (Contract No.) _____, and

WHEREAS, said Principal is required to furnish a bond in connection and with said contract, providing that if said Principal, or any of his or its subcontractors, shall 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 done thereon of any kind, the Surety on this bond will pay the same to the extent hereinafter set forth:

NOW, THEREFORE, We, the Principal, and _____ as Surety, are held and firmly bound unto the Obligee in the penal sum of _____ lawful money of the United States for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, or any of his or its subcontractors, shall fail to pay any of the persons named in Section 3181 of the Civil Code of the State of California, or any amounts due under the Unemployment Insurance Code with respect to such work or labor performed under the contract, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department of the State of California, from the wages of employees of the Principal and subcontractors pursuant to Section 13020 of the Unemployment Insurance Code of the State of California with respect to such work or labor, as required by the provisions of Section 3225 and following of the Civil Code of the State of California, then said Surety will pay the same in, or to an amount not exceeding the amount, hereinabove set forth, and also will pay, in case suit is brought upon this bond, reasonable attorneys' fees to such claimant and to the Obligee as shall be fixed by the Court.

This bond is issued pursuant to Civil Code Sections 3247 through 3252, inclusive, of the State of California, and shall inure to the benefit of any and all persons, companies, and corporations named in Section 3181 of said Civil Code so as to give a right of action to them or their assigns in any suit brought upon this bond.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract, or to the work to be performed thereunder, or the specifications accompanying the same shall, in any way, affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract, or to the work or to the specifications. Said Surety hereby waives the provisions of Sections 2819 and 2845 of the Civil Code of the State of California.

IN WITNESS WHEREOF, the above-bounden parties have signed this instrument under their seals this _____ day of _____, 20____, the name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representatives, pursuant to authority of its governing body.

(SEAL)

Principal

Signature for Principal

Title of Signatory

(SEAL)

Surety

Signature of Surety

Title of Signatory

(This bond must be submitted in sets of four, each bearing original signatures. The signature of the Attorney-In-Fact for the Surety must be acknowledged by a Notary Public. These bonds must be accompanied by a current Power of Attorney appointing such Attorney-In-Fact.)



Bond Number:

Premium:

FAITHFUL PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS, that WHEREAS the County of San Benito, State of California, hereinafter designated as the "Obligee," has on _____, 20____, awarded to _____ hereinafter designated as the "Principal," a contract for the construction of

_____ (Contract No. _____), and

WHEREAS said Principal is required, under the terms of the Contract, to furnish a bond for the faithful performance of said Contract:

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

THE CONDITION OF THIS OBLIGATION IS SUCH that, if the above bounden Principal, his or its heirs, executors, administrators, successors, or assigns shall in all things stand to and abide by, and well and truly keep and faithfully perform the covenants, conditions, and agreement in the said Contract, and any alterations made as therein provided, on his or their part to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the Obligee, its officers and agents as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and virtue, and Principal and Surety, in the event suit is brought on this bond, will pay to the Obligee such reasonable attorneys' fees as may be fixed by the Court.

As a condition precedent to the satisfactory completion of the said Contract, the above obligation in said amount shall hold good for a period of one (1) year after the completion and acceptance of the said work, during which time if the above bounden Principal, his or its heirs, executors, administrators, successors, or assigns shall fail to make full, complete, and satisfactory repair and replacements or totally protect the said Obligee from loss or damage made evident during said period of one (1) year from the date of acceptance of the work, and resulting from or caused by defective materials or faulty workmanship in the prosecution of the work done, the above obligation in the said sum shall remain in full force and effect. However, anything in this paragraph to the contrary notwithstanding, the obligation of the Surety hereunder shall continue so long as any obligation of the Principal remains.

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

specifications. Said Surety hereby waives the provisions of Section 2819 and 2845 of the Civil Code of the State of California.

IN WITNESS WHEREOF, the above bounden parties have signed this instrument under their seals this _____ day of _____, 20____, the name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(SEAL)

Principal

Signature for Principal

Title of Signatory

(SEAL)

Surety

Signature of Surety

Title of Signatory

(The signature of the Attorney-In-Fact for the Surety must be acknowledged by a Notary Public, and this bond must be accompanied by a current Power of Attorney appointing such Attorney-In-Fact. This bond must be submitted in sets of four, each bearing original signatures.)

PROCUREMENT REQUIREMENTS

SECTION 00 01 01

PROJECT DIRECTORY

OWNER:	SAN BENITO COUNTY 1131 San Felipe Rd Hollister, CA 95023 Phone: (831) 902-2207 Contact: Damon Felice
ARCHITECTS:	IN STUDIO ARCHITECTURE 250 Main Street Salinas, CA 93901 Phone: (831) 320-2655 Contact: Alex Reynoso
STRUCTURAL:	DONALD C. URFER AND ASSOC. INC. 2715 Porter Street Soquel, CA 95073 Phone: (831) 476-3681 Contact: Karen Wiinikka
MECHANICAL:	AXIOM ENGINEERS 22 Lower Ragsdale Drive, Suite A Monterey, CA 93940 Phone: (831) 649-8000 Contact: Bill Estes
ELECTRICAL/ COMMUNICATIONS:	AURUM CONSULTING ENGINEERS 60 Garden Court, Suite 210 Monterey, CA 93940 Phone: (916) 256-2460 Contact: Eldridge Bell

COUNTY OF SAN BENITO RESOURCE MANAGEMENT AGENCY



2301 Technology Parkway • Hollister, CA 95023-3840
831.636.4170 • 831.636.4176 fax • www.cosb.us

NOTICE TO CONTRACTORS

San Benito County Homeless Services Center – Phase III Bid

PROJECT: PWB-2001

Sealed Bids shall be delivered to the San Benito County Resource Management Agency, 2301 Technology Parkway, Hollister, California, 95023-3840, no later than **2:00 P.M. on Wednesday, March 18, 2020**. Bids will be opened and will be publicly read in the **RMA conference room, 2301 Technology Parkway, Hollister, California** at **2:00 P.M.** or thereafter. This project is for licensed contractors with a Type B license. The Contractor shall complete all or any designated portions of the work called for under the contract in all parts and requirements within 90 calendar days (except as modified in the technical specifications). The County of San Benito and its Board of Supervisors reserves the right to reject any or all Bids received as the public good may require.

There will be two mandatory pre-bid meetings, only one of which needs to be attended by prospective bidders. The meeting(s) will take place at 1161 San Felipe Road, Hollister, CA 95023, both will start at 11AM. The first meeting will take place on **February 27, 2020** and the second will take place on **March 4, 2020**.

Each contractor shall include in their Bid all labor, tools, and materials for a complete and working project for each trade component in conformance with the intent shown on the plans and specifications and specified herein.

Plans, Specifications and Bid forms to be used for bidding on this project can only be obtained by going to the San Benito County website at www.cosb.us. On the right-hand side, under Quicklinks, you will see "Bids & RFPs". Click on this link, and go down the page until you see "Listing of Advertised Projects". Click on this link and it will take you to E-Bid Board, where you will find the project name. Click on the name to see the IFB, plans and specs for this job. If you have any questions, please call the San Benito County Resource Management Agency, Public Works Division at (831) 636-4170.

Prospective Bidders must be fully qualified, licensed, certified, and insured to perform the work requested. All work performed must meet all current applicable laws and regulations.

Each Bidder must submit a Bid for the project for which they intend to bid to the Administrative Office on the standard forms enclosed. Said Bid shall be accompanied by a cashier's check, a certified check or bidder's bond of ten percent (10%) of the amount of the Bid submitted, to be made payable to the County of San Benito. Bid bonds shall be issued by a corporate surety duly admitted and authorized to issue bonds and undertakings by the State of California.

Pursuant to Section 1700, and following, of the California Labor Code, the Contractor shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Copies of such prevailing rate of per diem wages are available at the following web site: http://www.dir.ca.gov/DLSR/statistics_research.html#PWD. Those copies shall be made available to any interested party upon request. The Contractor shall forfeit, as penalty, to the County of San Benito, twenty-five dollars (\$25.00) for each calendar day or portion thereof, for each workman paid less than the stipulated prevailing rates for any work done under the contract by it or by any subcontractor under it, in violation of the provisions of such Labor Code.

County will be the sole judge as to the technical acceptability of any Bids and any award will be as determined most advantageous to the County considering such factors as completeness and responsiveness to this Invitation for Bids, experience, references, and anticipated costs. The County reserves the right to reject any or all Bids or parts thereof and to waive any informality or irregularity in any Bid or the bidding process.

Insurance requirements for the project shall be the amounts set forth in the General Conditions, Section 19, unless expressly modified below:

Commercial General Liability Insurance	\$ _____
All Risk Property Coverage or Builders Risk Insurance	\$ _____
Business Automobile Liability Insurance	\$ _____

INSTRUCTIONS TO BIDDERS

1) All portions of the Bid must be completed before the Bid is submitted. Failure to do so may result in the Bid being rejected as nonresponsive. Attached to and submitted with this Bid, Bidder must provide: (1) the Bid Schedule; (2) Names and Titles Form; (3) Bidder's Bond; (4) Reference List; (5) Subcontractor List; (6) Non-Collusion Affidavit, completed and signed by Bidder; (7) Statement of Compliance, completed and signed by Bidder; (8) Bidder's Qualifications, completed and signed by Bidder; (9) Guaranty, completed and signed by Bidder; (10) Contractor's Certificate as to Worker's Compensation, completed and signed by Bidder; and, (11) Affidavit Concerning Employment of Undocumented Aliens, completed and signed by Bidder. Failure to submit all required documents may result in the Bid being rejected as nonresponsive.

2) An original of the Bid form shall be filled in and submitted as the Bid.

3) County of San Benito has obtained report(s) that may contain facts that may materially affect Bidders' Bids. County of San Benito has constructed other public works projects throughout the County of San Benito, and obtained reports and other information in the course of the design and construction of those other public works construction projects, all of which may contain facts that may materially affect Bidders' Bids. Bidders are strongly encouraged to inspect applicable County of San Benito reports, records and documents. Said reports and documents will be made available upon written request at the Administrative Office, 481 Fourth Street, Hollister, California, 95023 for inspection and copying at Bidders' sole cost and expense, during normal working hours, Monday through Friday, 9:00 a.m. through 5:00 p.m..

4) If a pre-bid conference has been scheduled at the site of the work, all Bidders, subcontractors, material suppliers, and others who may be working on the work of improvement are strongly encouraged to attend this pre-bid conference. Due to the facts and circumstances of this particular project, the on-site pre-bid conference may be the only opportunity to conduct the pre-bid investigation of the site and satisfy the pre-bid obligations set forth in these Contract Documents. If a Bidder (or others) attend the entirety of a scheduled pre-bid on-site conference and need additional time to complete their investigation of the site or other pre-bid obligations set forth in these Contract Documents, Bidder must notify the County of San Benito in writing, via certified or registered mail, within three (3) days of the on-site pre-bid conference, to request additional time to complete its investigation of the site. The written request must include an estimate of the amount of additional time required by Bidder at the site. County of San Benito retains discretion to determine additional time requirements, if any.

5) Investigations of subsurface conditions or otherwise, are made for the purpose of design, and the County of San Benito assumes no responsibility whatsoever with respect to the sufficiency or accuracy of borings, the log of test borings, or other preliminary investigations, or of the interpretation thereof, and there is no guaranty, either expressed or implied, that the conditions indicated are representative of those existing throughout the work, or any part of it, or that unanticipated conditions may not occur. When a log of test borings or other report is made available to Contractor or included in the Contract Documents, it is expressly understood and agreed that said log of test borings or other reports does not constitute a part of the Contract, and represents only an opinion of the County of San Benito as to the character of the materials to be encountered, and is made available or included in the Contract Documents only for the convenience of the Bidders. Bidders must satisfy themselves, through their own investigation, as to conditions to be encountered.

6) In addition to other minimum qualifications, the County of San Benito has determined that the successful lowest responsive, responsible Bidder must demonstrate to the satisfaction of the County of San Benito, the following minimum experience to be qualified to perform the work described in the Contract Documents:

- a. Have possessed a valid, active and in good standing, State of California Department of Consumer Affairs, Contractor's License Board license, appropriate for trade being bid, for a minimum of five (5) continuous years prior to the date of Bid opening.
- b. Not have any pending disciplinary proceedings or investigations by the Contractor's State License Board.
- c. Currently (as of the date of Bid opening) or within the past year, not have any suspensions, disbarments, or similar proceedings (including stipulated agreements), restricting, limiting or prohibiting Bidder from bidding or performing other public works projects for any other public agency.

7) Following the opening of Bids, the County of San Benito may request in writing that the apparent lowest responsive, responsible Bidder complete a Contractor Qualifications Questionnaire and furnish all required supporting documentation to enable the County of San Benito to determine whether the apparent lowest responsive, responsible Bidder is qualified to perform the work described in the Contract Documents. By submission of a Bid, Bidder agrees to complete the Contractor Qualifications Questionnaire, furnish all required attachments, sign the Contractor Qualifications Questionnaire, all in strict conformance with the requirements of the Contract Documents and Contractor Qualifications Questionnaire, and return to the County of San Benito within ten (10) days of County of San Benito's written request. If Bidder fails or refuses to complete the Contractor Qualifications Questionnaire, furnish all required attachments, sign the Contractor Qualifications Questionnaire, or return it to the County of San Benito within ten (10) days of date of dispatch of County of San Benito's written request, Bidder may not be considered for award of the contract, and further, Bidder agrees that the County of San Benito may either award the work to another Bidder or call for new Bids. In such event, the Bidder shall be liable to the County of San Benito for the difference between the amount of the disqualified Bid and the larger amount for which the County of San Benito procures the work plus all of the County of San Benito's costs, damages, expenses, and liabilities.

8) If for any reason the County of San Benito elects to not award the contract to the apparent lowest responsive, responsible Bidder, the County of San Benito may request in writing that the apparent second lowest responsive, responsible Bidder complete the Contractor Qualifications Questionnaire and furnish all required supporting documentation to enable the County of San Benito to determine whether the second lowest responsive, responsible Bidder is qualified to perform the work described in the Contract Documents. If for any reason the County of San Benito elects to not award the contract to the apparent second lowest responsive, responsible Bidder, the County of San Benito may request the third lowest responsive, responsible Bidder complete the Contractor Qualifications Questionnaire and furnish all required supporting documentation, and so on.

9) If the County of San Benito receives from a Bidder within the time set forth in these Contract Documents, a complete Contractor Qualifications Questionnaire and all required supporting documentation as required by the Contract Documents, and if the County of San Benito determines that a Bidder is not qualified to perform the work required by the Contract Documents, and if the County of San Benito elects to not award the Contract to that Bidder, the County of San Benito will promptly return that Bidder's Bid security.

10) Bid protests shall be filed in writing with the County Administrative Officer, County of San Benito, Administrative Office, 481 Fourth Street, Hollister, California, 95023, by certified or registered mail, not later than three (3) days after the Bid opening or, if the protest is based on the selection of the apparent lowest responsive responsible Bidder, not later than three (3) days after selection of the apparent lowest responsive, responsible Bidder. The protest shall specify the reasons and facts upon which the protest is based.

BID

For: **HOMELESS SERVICES CENTER – PHASE III**

Name of Bidder: _____

Business Address : _____

Place of Residence: _____

Telephone / Fax: () / ()

Email: _____

DIR PWC#: _____

1) All portions of the Bid must be completed before the Bid is submitted. Failure to do so may result in the Bid being rejected as nonresponsive. Attached to and submitted with this Bid, Bidder must provide (1) the Bid Schedule; (2) Names and Titles Form; (3) Bidder's Bond; (4) Reference List; (5) Subcontractor List; (6) Non-Collusion Affidavit, completed and signed by Bidder; (7) Statement of Compliance, completed and signed by Bidder; (8) Bidder's Qualifications, completed and signed by Bidder; (9) the Guaranty, completed and signed by Bidder; (10) Contractor's Certificate as to Worker's Compensation, completed and signed by Bidder; and, (11) Affidavit Concerning Employment of Undocumented Aliens, completed and signed by Bidder. Failure to submit all required documents may result in the Bid being rejected as nonresponsive.

2) One copy of the Bid shall be filled in and submitted as the Bid.

3) The Bidder, having the appropriate active license required by the State of California; and having carefully read and examined the plans, specifications, and all related bidding documents as prepared by Damon Felice, County of San Benito for the **SBC Homeless Services Center – Phase III Bid** having carefully and fully examined the site of the proposed work and all information available to Bidder, and being familiar with all the conditions related to the proposed work, including the availability of materials, equipment, and labor, hereby offers to furnish all labor, materials, tools, transportation, services, and equipment necessary to complete the work of the described project in accordance with the Contract Documents, and to complete all requirements of the Contract Documents for the sums quoted in this Bid. The Bidder agrees that it will not withdraw its Bid within sixty (60) days after the Bid deadline. Bidder agrees, if requested by County of San Benito, to complete and sign the Contractor Qualification Questionnaire, furnishing all required attachments, and return it to County of San Benito within ten (10) days of date of dispatch by County of San Benito. If the Bidder is selected as the apparent lowest responsive, responsible Bidder, the Bidder agrees, within ten (10) days after date of dispatch of Notice of Award, to sign and deliver the Contract, and to furnish the Performance Bond, the Payment Bond, Certificates of Insurance, and other required items. If awarded the Contract, the Bidder agrees to complete the work within the number of calendar days specified by the Project Manager after the date of the commencement specified in the Notice to Proceed.

4) The Bidder agrees that if the Bidder is selected as the apparent lowest responsive, responsible Bidder, and the Bidder fails to sign the Contract and furnish (1) the **Performance Bond**, (2) the **Payment Bond**, (3) **Certificates of Insurance**, and (4) **other required items** within the time limit specified in the Contract Documents, the County of San Benito may award the work to another Bidder or call for new Bids. In such event, the Bidder shall be liable to the County of San Benito for the difference between the amount of the disqualified Bid and the larger amount for which the County of San Benito procures the work plus all of the County of San Benito's costs, damages, expenses and liabilities arising from Bidder's failure to sign the Contract and/or furnish the required documents.

I/We the undersigned hereby certify that I/We am/are a duly authorized official of the company and have the authority to sign on behalf of the company and assure that all statements made in the Bid are true. I/We agree to furnish and deliver the specified items/services at the prices stated herein, and have read, understand, and agree to the terms and conditions contained herein and on all of the attachments.

Contractor's License #: _____ Type: _____ (as applicable)

Signature of Authorized Official:

Name/Title of Authorized Official:

BID SCHEDULE

I will perform the work of the **SBC Homeless Services Center – Phase III Bid** as set forth in the Contract Documents and in conformance with all plans, specifications, requirements, conditions and instructions of County of San Benito Invitation for Bid, IFB No. PWB-2001, prepared by the County of San Benito, for the following lump sum price:

BASE BID (A) \$ _____

Total price in words: _____

I/We agree that the prices stated herein will be firm for ninety (90) calendar days from the Bid Submittal Deadline.

The work for the **Homeless Services Center – Phase III Bid** specifically includes: Modular construction components.

The Bidder acknowledges receipt of the following Addenda:

Addendum # _____, dated _____	_____	_____
	Signature	Date
Addendum # _____, dated _____	_____	_____
	Signature	Date
Addendum # _____, dated _____	_____	_____
	Signature	Date
Addendum # _____, dated _____	_____	_____
	Signature	Date

AUTHORIZED SIGNATURE OF BIDDER: _____

PRINT NAME/TITLE: _____

BUSINESS NAME: _____

Executed in _____, California, on _____, 2018

DATE: _____

NOTE:

Where quantities are shown they are engineers estimated quantities. Variations may occur between actual quantities and engineers estimated quantities. Bidder is responsible to calculate quantities when preparing the Bid. Payment will be based on lump sum Bid amount(s) and no allowance will be made for variations between actual quantities and engineer's estimated quantities.

NAMES AND TITLES FORM

NAMES AND TITLES OF KEY MEMBERS OF FIRM:

(Name of person signing the Bid on behalf of the Bidder and all general partners, if a partnership, must be included.)

Bidder is a: (circle one)

Corporation Partnership Individual Joint Venture Other _____
(Specify)

NAME OF PRESIDENT IF A CORPORATION: _____

NAME OF SECRETARY IF A CORPORATION: _____

CALIFORNIA CONTRACTORS LICENSE(S):

Name of License(s):

_____	_____	_____
Classification(s)	Number	Expiration Date

_____	_____	_____
Classification(s)	Number	Expiration Date

(For Joint Ventures, list Joint Venture's license or licenses for all Joint Venture partners.)

- 1) Is your firm authorized to do business in the State of California? ☐ Yes ☐ No
- 2) Is your firm a State of California registered small business? ☐ Yes ☐ No
- 3) Local Business ☐ Yes ☐ No
- 4) This firm has been in continuous business under the present name for _____ years.
- 5) Annual sales volume: _____
- 6) Net worth of business: \$ _____

NAMES AND TITLES FORM (continued)

NAME OF BIDDER'S FIRM: _____

Address: _____

Phone: _____

Fax: _____

Email: _____

By: _____
(Signature)

(Print or Type Name)

(Print or Type Title)

By: _____
(Signature)

(Print or Type Name)

(Print or Type Title)

(If signature is by other than the sole proprietor, general partner, or corporate officers, attach an original Power of Attorney.)

The following documents are submitted with and made a condition of this Bid:

Bid security in the form of _____ (fill in type of Bid security)

Corporation is organized under the laws of the State of _____.

Corporate Seal:

BIDDER'S BOND

Know All Persons by These Presents, That we, _____

_____, As PRINCIPAL, and _____

_____,
as SURETY, are held and firmly bound unto the County of San Benito of the State of California, hereinafter called the County, in the penal sum of TEN PERCENT (10%) OF THE TOTAL AMOUNT OF THE BID of the Principal above named, submitted by said Principal to the County for the work described below for the payment of such sum in lawful money of the United States, well and truly to be made, and we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

In no case shall the liability of the surety exceed the sum of _____
_____ (\$_____) Dollars.

THE CONDITION OF THIS OBLIGATION IS SUCH, That whereas the Principal has submitted the above mentioned bid to the County for certain construction specifically described as follows: **Homeless Services Center – Phase III Bid**: for which Bids are to be opened at Hollister, California on March 18, 2020 @ 2:00 p.m.

NOW, THEREFORE, If the aforesaid Principal is awarded the contract and, within the time and manner required under the specifications, after the prescribed forms are presented to him for signature, enters into a written contract, in the prescribed form, in accordance with the bid, and files two bonds with the Purchasing Agent, one to guarantee faithful performance and the other to guarantee payment for labor and materials, as required by law, then this obligation shall be null and void; or should the aforementioned contract be awarded to other than the herein named Principal, then this obligation shall be null and void; otherwise, it shall be and remain in full force and virtue.

IN WITNESS WHEREOF, We have hereunto set our hands and seals on this _____ day
of _____ A.D. 20_____.

_____(SEAL) _____(SEAL)

_____(SEAL) _____(SEAL)

_____(SEAL) _____(SEAL)

Surety

Principal

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

Address

REFERENCE LIST

1) NAME: _____

ADDRESS: _____

P.O. Box/Street City State Zip

CONTACT PERSON/TITLE: _____

TELEPHONE NUMBER: _____ FAX NUMBER: _____

DOLLAR AMOUNT OF CONTRACT: _____

DATES AND WORK PERFORMED: _____

2) NAME: _____

ADDRESS: _____

P.O. Box/Street City State Zip

CONTACT PERSON/TITLE: _____

TELEPHONE NUMBER: _____ FAX NUMBER: _____

DOLLAR AMOUNT OF CONTRACT: _____

DATES AND WORK PERFORMED: _____

3) NAME: _____

ADDRESS: _____

P.O. Box/Street City State Zip

CONTACT PERSON/TITLE: _____

TELEPHONE NUMBER: _____ FAX NUMBER: _____

DOLLAR AMOUNT OF CONTRACT: _____

DATES AND WORK PERFORMED: _____

SUBCONTRACTOR LIST

In compliance with the provisions of Section 4100 through 4114, inclusive, of the Public Contract Code, and any amendments thereto, each Bidder shall set forth in his or her Bid, **the name and location of the place of business** of each subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement, or a subcontractor licensed by the State of California who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of one percent (0.5%) of the prime contractor's total Bid and the portion of the work which will be done by each subcontractor under this act. The prime contractor shall list only one subcontractor for each portion as is defined by the prime contractor in his or her Bid.

Trade	1.	2.	3.
Name			
Location			
CSLB & DIR PWC #:			
Trade	4.	5.	6.
Name			
Location			
CSLB & DIR PWC #:			
Trade	7.	8.	9.
Name			
Location			
CSLB & DIR PWC #:			
Trade	10.	11.	12.
Name			
Location			
CSLB & DIR PWC #:			

NON-COLLUSION AFFIDAVIT

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID
Pursuant to Section 7106 of the Public Contract Code,

The undersigned declares:

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

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

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

Signature

STATEMENT OF COMPLIANCE

(Company Name)

(hereinafter referred to as "prospective Contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 and California Code of Regulations, Title II, Division 4, Chapter 5, in matters relating to the development, implementation, and maintenance of a nondiscrimination program. Prospective Contractor agrees not to unlawfully discriminate against any employee or applicants for employment because of race, religion, color, national origin, ancestry, physical handicap, medical condition, marital status, sex, sexual orientation, physical and mental disabilities, or age (over forty).

I, _____
(Name of Official)

hereby swear that I am duly authorized to legally bind the prospective Contractor to the above-described certification. I am fully aware that this certification, signed on

(date)

in the County of _____, is made under the penalty of perjury under the
(County)
laws of the State of California.

(Signature)

(Print or Type Title)

BIDDER QUALIFICATIONS

This form must be completed, signed by Bidder, and submitted to County of San Benito with Bidder's Bid. Failure to complete, sign, and submit with Bidder's Bid may result in Bidder's Bid being rejected as not responsive.

County of San Benito has determined that Bidders must meet the following minimum qualifications to bid the work of improvement contemplated herein:

1. Have possessed a valid, active and in good standing, State of California Department of Consumer Affairs, Contractor's License Board license, appropriate for trade being Bid, for a minimum of five (5) continuous years prior to the date of Bid opening.
2. Not have any pending disciplinary proceedings or investigations by the Contractor's State License Board.
3. Currently (as of the date of Bid opening) or within the past year, not have any suspensions, disbarments, or similar proceedings (including stipulated agreements), restricting, limiting or prohibiting Bidder from bidding or performing other public works for any other public agency.

I, being the _____ (insert title) of Bidder herein, declare that Bidder meets all of the minimum criteria set forth above.

Signature

Print Name

Date

GUARANTY

TO THE COUNTY OF SAN BENITO

The undersigned, as prime Contractor, guarantees the construction and installation of the following work included in this project:

SAN BENITO COUNTY HOMELESS SERVICES CENTER – PHASE III BID

Should any of the materials or equipment prove defective, due to faulty workmanship, material furnished or methods of installation or should the work or any part thereof fail to operate properly as originally intended and in accordance with the plans and specifications, due to any of the above causes, all within **one year** after the date on which this contract work is accepted by the County, the undersigned agrees to reimburse the County, upon demand, for County's expenses incurred in restoring said work to the condition contemplated in said project, including the cost of any such equipment or materials replaced and the cost of removing and replacing any other work necessary to make such replacement or repairs, or, upon demand by the County, to replace any such material and to repair said work completely without cost to the County so that said work will function successfully as originally contemplated. (Ordinary wear and tear and unusual abuse or neglect excepted).

The County shall have the unqualified option to make any needed replacement or repairs itself or to have such replacements or repairs done by the undersigned. In the event the County elects to have said work performed by the undersigned, the undersigned agrees that the repairs shall be made and such materials as are necessary shall be furnished and installed within a reasonable time after the receipt of demand from the County. If the undersigned shall fail or refuse to comply with his obligations under this guaranty, the County shall be entitled to all costs and expenses, including attorney's fees, reasonably incurred by reason of said failure or refusal.

Contractor, Name and Address

Date

By _____
Signature of Principal

CONTRACTOR'S CERTIFICATE AS TO WORKER'S COMPENSATION

(Labor Code section 1861)

Labor Code section 3700 provides, in relevant part:

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

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

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

I certify that I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Worker's Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this contract.

Dated: _____

Bidder's business name

By: _____

Print Name: _____

And Title: _____

AFFIDAVIT CONCERNING EMPLOYMENT OF UNDOCUMENTED ALIENS
TO BE SUBMITTED WITH BID

(Public Contract Code section 6101)

Public Contract Code section 6101 provides that,

"No state agency or department, as defined in [Public Contract Code] Section 10335.7, that is subject to this code, shall award a public works or purchase contract to a bidder or contractor, nor shall a bidder or contractor be eligible to bid for or receive a public works or purchase contract, who has, in the preceding five years, been convicted of violating a state or federal law respecting the employment of undocumented aliens.

_____ (Name), being first duly sworn, deposes and says (1) that he or she is the _____ (Title) of _____ (DBA), the party making the foregoing Bid; and (2) that the party making the foregoing Bid has not, within the preceding five (5) years, been convicted of violating a state or federal law respecting the employment of undocumented aliens.

Dated: _____

Bidder's business name

By: _____

Print Name: _____

Title: _____

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section & all Sections.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work under separate contracts.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and Drawing conventions.
7. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: **Facility Tenant Improvement (Phase III)– Homeless Services Center (HSC) County of San Benito – Resource Management Agency**

1. Project Location: **1161 San Felipe Road, Hollister, CA 95023**

B. Owner: **County of San Benito**

1. Owner's Representative: Adam Goldstone, Capital Program Manager

C. Architect: **ISA – In Studio Architecture**

1. Representative: Alex Reynoso
2. Tel: 831-320-2655
3. Email: alex@isarch.net

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:

1. **A Facility Tenant Improvement for an existing Homeless Services Center (HSC) including Six Dormitory Units & Support Space as indicated in the drawings & specifications.**

B. Type of Contract:

1. Project will be constructed under a single prime contract.
2. Contractor will be asked to coordinate with the owner for the temporary move and cooler needs which will be conducted under a separate contract.

1.5 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits (buildings as part of scope of work) and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Driveways, Walkways and Entrances: Keep driveways parking, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Partially Owner Occupancy: Owner will occupy site and existing building(s) during construction period of sections of the warehouse areas. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.

2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Architect's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
- E. Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 1. Maintain list of approved screened personnel with Owner's representative.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified by reference keynotes; refer to Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

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 substitutions.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for products selected under an allowance.
 - 2. Section 012300 "Alternates" for products selected under an alternate.
 - 3. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size,

durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Cost information, including a proposal of change, if any, in the Contract Sum.
 - j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within (7) seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within (15) fifteen days of receipt of request, or (7) seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than (15) fifteen days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed (unless otherwise indicated).

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

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 handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
- 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 - 7. Proposal Request Form: Use form acceptable to Architect.

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

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 necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.
 - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than (7) seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.

- c. Architect's Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703.
 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 7. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 8. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
 9. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

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

- B. Payment Application Times: Submit Application for Payment to Architect by the fifth of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
 - 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).
 6. Sustainable design action plans, including preliminary project materials cost data.
 7. Schedule of unit prices.
 8. Submittal schedule (preliminary if not final).
 9. List of Contractor's staff assignments.
 10. List of Contractor's principal consultants.
 11. Copies of building permits.
 12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 13. Initial progress report.
 14. Report of preconstruction conference.
- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.

4. AIA Document G706.
5. AIA Document G706A.
6. AIA Document G707.
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

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 provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 7 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project

site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - e. Indicate required installation sequences.
 - f. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
11. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

- a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
- b. Digital Data Software Program: Drawings are available in PDF.
- c. Contractor shall execute a data licensing agreement in the form of AIA Document C106 if DWG format files are required.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Unacceptable Request For Information (RFI):
 - 1. General: Do not submit requests for information for confirmation of any action already taken by the Contractor. Requests will not be accepted that imply confirmation of any unauthorized change to the Work.
 - 2. Untimely Submission: A request for information that is submitted in a belated manner without proper coordination and scheduling of the Work of related subcontractors will not be reviewed and will be returned to the Contractor.
 - 3. Frivolous RFI: Contractor shall be charged all reasonable costs including fees for professional services of Architect, but not less than one hundred dollars (\$100.00) for costs associated with submittal of each RFI determined to be frivolous. Among other remedies, the District can deduct this amount from progress payments. Basis for determining a frivolous RFI includes but is not limited to one of the following factors: Lack of the Contractor exercising due diligence to locate required information in the Contract Documents; request for information that is apparent from field observations, or is contained in the Contract Documents or is reasonably inferable from them; request for information that is repetitive or is substantially incomplete. The Architect shall be solely responsible for determining whether a RFI is frivolous.
- C. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Architect.
 - 6. RFI number, numbered sequentially.
 - 7. RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Field dimensions and conditions, as appropriate.

11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- D. RFI Forms: AIA Document G716 or form acceptable to Architect.
1. Attachments shall be electronic files in PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.

8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
- G. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.8 PROJECT MEETINGS

- A. General: Architect will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing (if applicable)
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Preparation of Record Documents.
 - o. Use of the premises and existing building.
 - p. Work restrictions.
 - q. Working hours.
 - r. Owner's occupancy requirements.
 - s. Responsibility for temporary facilities and controls.
 - t. Procedures for moisture and mold control.

- u. Procedures for disruptions and shutdowns.
 - v. Construction waste management and recycling.
 - w. Parking availability.
 - x. Office, work, and storage areas.
 - y. Equipment deliveries and priorities.
 - z. First aid.
 - aa. Security.
 - bb. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for delivery of material samples, attic stock, and spare parts.
 - g. Requirements for demonstration and training.
 - h. Preparation of Contractor's punch list.
 - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - j. Submittal procedures.
 - k. Owner's partial occupancy requirements.
 - l. Installation of Owner's furniture, fixtures, and equipment.
 - m. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Architect will conduct progress meetings at weekly intervals.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction

behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

- 1) Review schedule for next period.
- b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site use.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of Proposal Requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

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 documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Construction schedule updating reports.
 - 3. Daily construction reports.
 - 4. Material location reports.
 - 5. Site condition reports.
 - 6. Unusual event reports.
- B. Related Requirements:
 - 1. Section 012900 "Payment Procedures" for submitting the Schedule of Values.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF file.
 - 3. Five (5) paper copies, of sufficient size to display entire period or schedule, as required.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- C. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.
- D. Construction Schedule Updating Reports: Submit with Applications for Payment.
- E. Unusual Event Reports: Submit at time of unusual event.
- F. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review submittal requirements and procedures.
 - 7. Review time required for review of submittals and resubmittals.
 - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 9. Review time required for Project closeout and Owner startup procedures.
 - 10. Review and finalize list of construction activities to be included in schedule.
 - 11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for day one of the contract to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities

in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

2. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 3. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use-of-premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.

- l. Building flush-out.
 - m. Startup and placement into final use and operation.
8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
- a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
- 1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
- 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and the Contract Time.
- G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
- 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- H. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

- I. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for commencement of the Work
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 CPM SCHEDULE REQUIREMENTS

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for commencement of the Work.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
 - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and inspection.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.

3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

1.10 REPORTS

- A. Reports: As required by Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

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:

- 1. Submittal schedule requirements.
 - 2. Administrative and procedural requirements for submittals.

- B. Related Requirements:

- 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
 - 3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
 - 5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
 - 6. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 7. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 8. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.
- B. Submittal Time Frame: All submittals must be received by the Architect no later than fourteen (14) calendar days after the date established for commencement of work. Interim Liquidated Damages associated with failure to meet this requirement will be assessed at \$100 per day.

1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Architect.
 - 4. Name of Contractor.

5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Category and type of submittal.
8. Submittal purpose and description.
9. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
10. Drawing number and detail references, as appropriate.
11. Indication of full or partial submittal.
12. Location(s) where product is to be installed, as appropriate.
13. Other necessary identification.
14. Remarks.
15. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate (highlight) deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Paper Submittals:

1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
2. Provide a space approximately **6 by 8 inches (150 by 200 mm)** on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
6. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

E. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number. Follow all other requirements of Paper Submittals.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.

- a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
 2. Paper: Prepare submittals in paper form, and deliver to Architect.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
- a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on **Architect's** receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 7 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 14 days for initial review of each submittal.
- D. Deviations: Identify **all** deviations from the Contract Documents on submittals, in a conspicuous fashion so as to be clearly visible.
- E. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Provide a response to **all** submittal comments from the previous submittal. Failure to do so will cause rejection of the submittal and a back charge to the contractor for additional review time of \$200 for each additional resubmittal.
 4. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

- F. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- G. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.

2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least **8-1/2 by 11 inches (215 by 280 mm)**, but no larger than **30 by 42 inches (750 by 1067 mm)**.
 3. Submit Shop Drawings in the following format:
 - a. Paper copies unless otherwise indicated. Submit the same number as listed for Action submittals above.
 - b. Submit Shop Drawings in PDF electronic format.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

- 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
6. Color Selection: Will be made by Architect once preliminary submittals for all items requiring color selection have been reviewed and accepted by the Architect.
- a. The Architect will present color selections to the owner for approval before releasing to the contractor.
 - b. Field Samples:
 - 1) See individual sections for items requiring field samples.
 - 2) Use approved color selections to prepare actual on-site materials, textures and colors in trial areas selected by the Architect. Exterior color samples will include one building corner from grade to roof; interior field samples will include at least one wall corner as well as floor and ceiling where required.
 - 3) The Architect reserves the right to make minor changes to texture, color value and hue at no change to contract price.
 - 4) Do not commence finish work until Architect has approved field samples in writing.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be

signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.

2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
 - 1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.
 - 2. Paper Submittals: Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review submittals received from sources other than Contractor.
- F. Resubmittals that do not respond to **all** comments and/or markings from the previous submittal will be considered non-responsive. They will be returned without further review and the contractor will be charged \$200 for each additional resubmittal.
- G. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

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 quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
 - 1. Section 012100 "Allowances" for testing and inspection allowances.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of **five** previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
 - F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
 - G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
 - H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
 - I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
 - J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.
 - K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- 1.4 CONFLICTING REQUIREMENTS
- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For mockups.
 1. Include plans, sections, and elevations, indicating materials and size of mockup construction.
 2. Indicate manufacturer and model number of individual components.
 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 1. Specification Section number and title.
 2. Entity responsible for performing tests and inspections.
 3. Description of test and inspection.
 4. Identification of applicable standards.
 5. Identification of test and inspection methods.
 6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.

- G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
- F. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- G. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mockups when directed, unless otherwise indicated.

1.8 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified Inspector and testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Inspection: The owner will employ and pay for the services of a project inspector to perform services which are the owner's responsibility in accordance with the provisions of Section 4-333 and 4-342, title 24, Part 1, CCR.
 3. Testing: The owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the owner's responsibility in accordance with the provisions of Section 4-335, title 24, Part 1, CCR.
 4. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. **Testing Agency Responsibilities:** Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- F. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

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 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

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 requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete or galvanized-steel bases for supporting posts.
- B. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

2.2 TEMPORARY FACILITIES

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
 1. Connect temporary service to Owner's existing power source, as directed by Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.
 1. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.

- b. Ambulance service.
- c. Contractor's home office.
- d. Contractor's emergency after-hours telephone number.
- e. Architect's office.
- f. Engineers' offices.
- g. Owner's office.
- h. Principal subcontractors' field and home offices.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

- 1. Provide construction for temporary offices, shops, and sheds located within construction area or within **30 feet (9 m)** of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
- 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

- 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
- 2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

- 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
- 2. Remove snow and ice as required to minimize accumulations.

E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

- 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
- 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
- 3. Maintain and touch up signs so they are legible at all times.

F. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- F. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
 - 1. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
 - 2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - 3. Insulate partitions to control noise transmission to occupied areas.
 - 4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 5. Protect air-handling equipment.
 - 6. Provide walk-off mats at each entrance through temporary partition.

3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - 3. Indicate methods to be used to avoid trapping water in finished work.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.

3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard and replace stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

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 selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 1. Section 012100 "Allowances" for products selected under an allowance.
 2. Section 012300 "Alternates" for products selected under an alternate.
 3. Section 012500 "Substitution Procedures" for requests for substitutions.
 4. Section 014200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Timing: Comply with requirements of Section 013300 "Submittal Procedures".

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 2. Evidence that proposed product provides specified warranty.
 3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 4. Samples, if requested.

2.3 ARCHITECT'S ACTION

- A. Substitutions or Comparable Products: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution or a comparable product. Architect will notify Contractor of acceptance or rejection within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
1. Form of Approval: Architect's written directive.
 2. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
 3. Only one request for substitution or comparable product will be considered for each product. If the proposed substitution or comparable product is not accepted the Contractor will provide the specified product.
 4. With respect to finishes, visual or aesthetic effect is a significant basis for determining equivalency and may be the single cause for rejection based solely on the Architect's determination.

5. The burden of proof for equivalency rests entirely with the Contractor. The opinion of the Architect, as the original specifier, shall be the final determination.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

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 general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 013300 "Submittal Procedures" for submitting surveys.
 - 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding.

Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Fire separation assemblies.
 - b. Air or smoke barriers.
 - c. Fire-suppression systems.
 - d. Mechanical systems piping and ducts.
 - e. Control systems.
 - f. Communication systems.
 - g. Electrical wiring systems.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Equipment supports.
 - d. Piping, ductwork, vessels, and equipment.
 - e. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

C. PRODUCTS

1.5 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

2.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

2.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

2.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

2.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. 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.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

2.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

2.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

2.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
 - C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 - D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
 - E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
 - F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
 - G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."
 - H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
 - I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
 - J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

2.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

2.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

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 the following:
 - 1. Recycling nonhazardous demolition and construction waste.
 - 2. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of **50** percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work.

1.6 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING DEMOLITION WASTE

- A. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- B. Metals: Separate metals by type.
 - 1. Structural Steel: Stack members according to size, type of member, and length.
 - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- C. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

3.4 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.

3.5 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

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 contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
- B. Related Requirements:
 - 1. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 2. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 7 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.

- a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
 5. Submit testing, adjusting, and balancing records.
 6. Submit sustainable design submittals not previously submitted.
 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 7 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.
 6. Advise Owner of changeover in utility services.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 7 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.4 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed

- and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 - 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - 4. Submit pest-control final inspection report.
 - 5. Submit final completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 7 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
- 1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
- 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 - 4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated file.
 - b. PDF electronic file. Architect will return annotated file.

1.6 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

C. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.

- d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment[, **elevator equipment**,] and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

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 preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
 - 1. Submit three paper copies. Architect will return two copies.

- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least **15** days before commencing demonstration and training. Architect will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within **15** days of receipt of Architect's comments and prior to commencing demonstration and training.
- D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
 - 1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold **8-1/2-by-11-inch (215-by-280-mm)** paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - 3. Supplementary Text: Prepared on **8-1/2-by-11-inch (215-by-280-mm)** white bond paper.
 - 4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

- a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Construction Manager.
 - 7. Name and contact information for Architect.
 - 8. Name and contact information for Commissioning Authority.
 - 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
 - 1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 - 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 - 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency.
 - 2. Emergency instructions.
 - 3. Emergency procedures.
- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 1. Fire.
 - 2. Flood.
 - 3. Gas leak.
 - 4. Water leak.
 - 5. Power failure.
 - 6. Water outage.
 - 7. System, subsystem, or equipment failure.
 - 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.
 - 3. Operating instructions for conditions outside normal operating limits.
 - 4. Required sequences for electric or electronic systems.
 - 5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Seasonal and weekend operating instructions.
 - 8. Required sequences for electric or electronic systems.
 - 9. Special operating instructions and procedures.

- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.

- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.
- I. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.

- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for final property survey.
 - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
 - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up Record Prints plus one set of reproducible drawings.
 - 2. Sample Record Drawing: Prior to preparing the marked-up Record Prints submit a sample of recording technique and drafting for Architect's review and comment. Revise as noted to establish a quality standard for the entire set of drawings.
- B. Record Specifications: Not required.
- C. Record Product Data:
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected drawings of the Contract Drawings and Shop Drawings.
1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
 2. Refer instances of uncertainty to Architect for resolution.
 3. Print the Contract Drawings and Shop Drawings for use as Record Drawings.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.

1.6 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017839

SECTION 024119 - SELECTIVE 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 selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.

- B. Related Requirements:

- 1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 017300 "Execution" for cutting and patching procedures.
 - 3. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and **deliver to Owner ready for reuse**.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

Retain "Predemolition Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

- A. Predemolition Conference: Conduct conference at **Project site**.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, **for environmental protection and for dust control**. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. 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.
- E. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.

1.11 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's 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 ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 8. Dispose of demolished items and materials promptly. **Comply with requirements in Section 017419 "Construction Waste Management and Disposal."**
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Reinstalled Items:
 1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition **and cleaned** and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." **Do not use methods requiring solvent-based adhesive strippers.**
- E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See specific Roofing Section for new roofing requirements.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories as delineated in drawings.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site **and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."**
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 033000 - 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. Foundation Walls.
 - 3. Slabs-on-grade.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
 - 2. Section 321313 "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, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **Project site**.
 - 1. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include 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.
- 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.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **Installer and testing agency**.
- B. Welding certificates (if welding is required).
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Fiber reinforcement.
 - 6. Waterstops.
 - 7. Curing compounds.
 - 8. Floor and slab treatments.
 - 9. Bonding agents.
 - 10. Adhesives.
 - 11. Vapor retarders.
 - 12. Semirigid joint filler.
 - 13. Joint-filler strips.
 - 14. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
 - 1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
- F. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

- G. Field quality-control reports.
- H. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, **acceptable to authorities having jurisdiction**, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 FIELD CONDITIONS

- A. 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 (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 - 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.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERES

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 1. ACI 301 (ACI 301M).
 2. ACI 117 (ACI 117M).

2.3 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that 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.
- B. 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.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.

2.4 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed unless otherwise noted.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.5 REINFORCEMENT ACCESSORIES

- A. 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 zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.6 CONCRETE MATERIALS

- A. 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.
- B. Cementitious Materials:
 1. Portland Cement: ASTM C 150/C 150M, **Type I, gray**.
 2. Fly Ash: ASTM C 618, **Class F**.
 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal at Slabs-on-grade and 1" nominal at footings and foundation walls.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.

- E. 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 or admixtures containing calcium chloride.
 - 1. Any admixture proposed by the contractor shall be subject to the specified approval of the Architect, Structural Engineer and the Testing Lab.

- F. Water: ASTM C 94/C 94M and potable.

2.7 VAPOR RETARDERS

- A. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick.

2.8 CURING MATERIALS

- A. Evaporation Retarder: Manufactured for application to fresh concrete.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
 - a. Creteseal, CS2000.
 - b. Approved equal.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: **ASTM D 1751, asphalt-saturated cellulosic fiber.**

2.10 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, according to ACI 301 (ACI 301M).
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
 - 2. Fly Ash: 25 percent.
 - 3. Combined Fly Ash and Pozzolan: 25 percent.
 - 4. Slag Cement: 50 percent.
 - 5. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
- B. Admixtures: Use admixtures according to manufacturer's written instructions.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Normal-weight concrete.
 - 1. Minimum Compressive Strength: **3000 psi (20.7 MPa)** at 28 days.
 - 2. Maximum W/C Ratio: **0.50**.
 - 3. Slump Limit: **4 inches (100 mm)**.
- B. Foundation Walls: Normal-weight concrete.
 - 1. Minimum Compressive Strength: **3000 psi (20.7 MPa)** at 28 days.
 - 2. Maximum W/C Ratio: **0.50**.
 - 3. Slump Limit: **4 inches (100 mm)**.
- C. Slabs-on-Grade: Normal-weight concrete.
 - 1. Minimum Compressive Strength: **2800 psi (19.3 MPa)** at 28 days.
 - 2. Maximum W/C Ratio: **0.50**.
 - 3. Minimum Cementitious Materials Content: **520 lb/cu. yd. (309 kg/cu. m)**.
 - 4. Slump Limit: **4 inches (100 mm)**.

2.12 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M[**and ASTM C 1116/C 1116M**], and furnish batch ticket information.
 - 1. When air temperature is between **85 and 90 deg F (30 and 32 deg C)**, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above **90 deg F (32 deg C)**, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to **ACI 301 (ACI 301M)**, 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 (ACI 117M)**.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. **Class A, 1/8 inch (3.2 mm)** for smooth-formed finished surfaces.
 - 2. **Class C, 1/2 inch (13 mm)** for rough-formed finished surfaces.

- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct 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 ITEM INSTALLATION

- 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 303.
 - 2. Install dovetail anchor slots in concrete structures as indicated.

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 (10 deg C)** 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 support weight of concrete in place until concrete has achieved **at least 70 percent of** its 28-day design compressive strength.
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not 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 unless approved by Architect.

3.4 SHORING AND RESHORING INSTALLATION

- A. Comply with **ACI 318 (ACI 318M)** and **ACI 301 (ACI 301M)** for design, installation, and removal of shoring and reshoring.
1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. 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-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
1. Lap joints **6 inches (150 mm)** and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting 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 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/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. 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.
 2. Form keyed joints as indicated. Embed keys at least **1-1/2 inches (38 mm)** into concrete.
 3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: 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. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of **1/8 inch (3.2 mm)**. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch- (3.2-mm-)** wide joints into concrete when cutting action does 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. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

- 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 is 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 not to 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 (ACI 301M)**.
 - 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 (150 mm)** 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 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.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: 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: 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, or to be covered with a coating or covering material applied directly to concrete**.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, 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 (6 mm)** in one direction.
- 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 restraighening until surface is left with a uniform, smooth, granular texture.
- 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, 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 (ASTM E 1155M)**, 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.
- 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 thinset 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. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
 - 1. Uniformly spread **25 lb/100 sq. ft. (12 kg/10 sq. m)** of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- 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.

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** (**ACI 301M**) for hot-weather protection during curing.
- B. 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 remainder of curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1, and in accordance with Creteseal strict instructions.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least **six** month(s). 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 joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least **2 inches** (**50 mm**) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 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 1 part portland cement to 2-1/2 parts fine aggregate passing a **No. 16** (**1.18-mm**) 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 (13 mm)** in any dimension to solid concrete. Limit cut depth to **3/4 inch (19 mm)**. 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 matches 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 (0.25 mm)** 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. Repair defective areas, except random cracks and single holes **1 inch (25 mm)** 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 (19-mm)** 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.
 6. Repair random cracks and single holes **1 inch (25 mm)** 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.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight 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 C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - 7. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 - 8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 - 9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other

requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

SECTION 035416 – HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, general provisions of the Contract, and other related construction documents such as Division 01 specifications apply to this Section

1.2 SUMMARY

- A. This Section includes a self-leveling underlayment that consists of a blend of Portland cement and other hydraulic cements and polymers that is used to level and smooth interior concrete, terrazzo, well-bonded ceramic & quarry tile, epoxy coating systems, wood, metal and properly prepared, non-water-soluble adhesive residue on concrete prior to the installation of finish flooring on all grade levels.

- 1. ARDEX K 15[®] Premium Self-Leveling Underlayment
 - 2. ARDEX P 51[™] Primer

- B. Related Sections included the following:

- 1. Section 03 30 00, Cast-In-Place Concrete
 - 2. Division 09 Flooring Sections

1.3 REFERENCES

- A. ASTM C109M, Compressive Strength Air-Cure Only
- B. ASTM C348, Flexural Strength of Hydraulic-Cement Mortars
- C. ASTM F2170, Relative Humidity in Concrete Floor Slabs Using in situ Probes
- D. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used. Include manufacturer's Safety Data Sheets.
- B. Qualification Data: For Installer

1.5 QUALITY ASSURANCE

- A. Installation of the ARDEX product must be completed by a factory-trained applicator, such as an ARDEX LevelMaster® Elite, Choice Contractor or INSTALL Substrate Prep Certified Installer, using mixing equipment and tools approved by the manufacturer. Contact ARDEX Engineered Cements (724) 203-5000 for a list of recommended installers.
- B. Product must have a hydraulic cement-based inorganic binder content as the primary binder which includes portland cement per ASTM C150: Standard Specification for Portland Cement and other specialty hydraulic cements. Gypsum-based products are not acceptable.
- C. Manufacturer Experience: Provide products of this section by companies which have successfully specialized in production of this type of work for not less than 10 years. Contact Manufacturer Representative prior to installation.

- 1.6 WARRANTY: ARDEX K 15® installed as part of a floor system, shall be installed in conjunction with the recommended ARDEX Tile & Stone Installation Materials or WW HENRY Flooring Adhesive, as appropriate, to provide the ARDEX SystemOne comprehensive warranty, depending on the system installed.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.
- B. Store products in a dry area with temperature maintained between 50° and 85°F (10° and 29°C) and protect from direct sunlight.
- C. Handle products in accordance with manufacturer's printed recommendations.

1.8 PROJECT CONDITIONS

- A. Do not install material below 50°F (10°C) surface and air temperatures. These temperatures must also be maintained during and for 48 hours after the installation of products included in this section. Install quickly if the substrate is warm and follow warm weather instructions available from the ARDEX Technical Service Department.

PART 2 - PRODUCTS

2.1 HYDRAULIC CEMENT UNDERLAYMENT (TYPE 1)

- A. Hydraulic Cement-Based Self-Leveling Underlayment
 - 1. Acceptable Products:

- a. ARDEX K 15®; Manufactured by ARDEX Engineered Cements: 400 Ardex Park Drive, Aliquippa, PA, 15001, USA, (724) 203-5000, www.ardexamericas.com i. Primer:

1. Standard Absorbent Concrete: ARDEX P 51™ Primer
2. Extremely Absorbent Concrete: May require two applications of ARDEX P 51™ to minimize the potential for pinholes forming in the ARDEX K 15.

- ii. Performance and Physical Properties: Meet or exceed the following values for material cured at 73° F+/-3°F (23° C+/-3°C) and 50% +/-5% relative humidity:

1. Application: Barrel Mix or Pump
2. Flow Time: 10 minutes
3. Walkable: 2 to 3 hours
4. Compressive Strength: 5,500 psi (385 kg/cm²) at 28 days, ASTM C109M
5. Flexural Strength: 1,200 psi (84 kg/cm²) at 28 days, ASTM C348
6. VOC: 0

2.2 WATER: Water shall be clean, potable, and sufficiently cool (not warmer than 70°F).

PART 3 – EXECUTION

3.1 PREPARATION

- A. General: Prepare substrate in accordance with manufacturer's instructions.

1. Concrete:

- a. Prior to proceeding please refer to ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring. All concrete subfloors must be sound, solid, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker before priming. Mechanically clean if necessary using shot blasting or other. Acid etching and the use of sweeping compounds and solvents are not acceptable.
- b. Substrates shall be inspected in accordance with ASTM F2170 and corrected for moisture or any other conditions that could affect the performance of the underlayment or the finished floor covering. For areas where moisture vapor emissions exceed the required limits refer to Section 09 05 61.13, Moisture Vapor Emission Control and install the appropriate ARDEX Moisture Control System.

- B. Crack and Joint Preparation:

1. Moving Joints and Moving Cracks – honor all expansion, isolation joints and moving cracks up through the underlayment. A flexible sealing compound such as ARDEX ARDISEAL™ Rapid Plus Semi-Rigid Joint Sealant may be installed.
 2. Saw Cuts, Dormant Control Joints and Dormant Cracks – fill all dormant control joints and dormant cracks with ARDEX ARDIFIX™ Low Viscosity Rigid Polyurethane Crack & Joint Repair or ARDEX FEATHER FINISH® Self-Drying, Cement-Based Finish Underlayment as recommended by the manufacturer.
- C. Adhesive residues on concrete must first be tested to make certain they are not water-soluble. Water-soluble adhesives must be completely mechanically removed down to clean concrete. Non-water-soluble adhesives should be prepared to a thin, well-bonded residue using the wet scraping technique as recommended by the Resilient Floor Covering Institute (www.rfci.com). The prepared residue should appear as nothing more than a transparent stain on the concrete after scraping.
- D. Non-porous subfloors such as ceramic, porcelain and quarry tile, burnished concrete, epoxy coating systems as well as terrazzo should be clean and free of all waxes, sealers, dust, dirt, debris and any other contaminant that may act as a bond breaker. If necessary, clean by mechanical methods such as shot blasting.

3.2 APPLICATION OF ARDEX K 15®

- A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.
- C. Priming:
1. Note: When using ARDEX P 51, It is critical to ensure that the ARDEX P 51 is dry prior to proceeding with the next installation step. To determine if the ARDEX P 51 is dry after a minimum of 30 minutes (max. 24 hours), pour water onto the surface of the primer in several areas and rub it with your finger. If the water remains clear, the primer is dry. If the water turns cloudy or milky, additional drying time is needed.
 2. Primer for standard absorbent concrete subfloors: Dilute ARDEX P 51 1:1 with water and apply evenly with a soft push broom. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry to a clear, thin film (min. 30 minutes, max. 24 hours). Underlayment shall not be applied until the primer is dry.
 3. Primer for extremely absorbent concrete subfloors: Make an initial application of ARDEX P 51 mixed with 3 parts water using a soft push broom. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry thoroughly (1 to 3 hours) before proceeding with the standard application of primer as described above for standard absorbent concrete.

4. Primer for non-porous subfloors such as burnished concrete, terrazzo, well-bonded ceramic, porcelain and quarry tile, epoxy coating systems, wooden subfloors and non-water soluble adhesive residues over concrete: Prime with ARDEX P 82 Ultra Prime. Follow the mixing instructions on the container and apply with a short-nap or sponge paint roller, leaving a thin coat of primer no heavier than a coat of paint. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry to a clear, slightly tacky film (minimum 3 hours, maximum 24 hours). Underlayment shall not be installed until primer is dry. Note: If a suitable acrylic curing compound has been used on the concrete, test the surface for porosity. If the concrete is porous, prime with ARDEX P 51. If it is non-porous, prime with ARDEX P 82. For wood substrates, once the primer is applied, install 3.4 galvanized, expanded diamond metal lath mesh, stapling approximately every 6 inches (15.2 cm). Do not walk on wet primer.

D. Mixing: Comply with manufacturer's printed instructions and the following.

1. Add 7 quarts (6.6 L) of clean potable water per 55 lb. (25 kg) bag. For applications over wood and metal, the addition of ARDEX E 25™ Resilient Emulsion is required to increase the resiliency of the ARDEX K 15. In these cases, mix 2 quarts (1.9 L) of ARDEX E 25 with 6 quarts (5.68 L) of water for each bag of ARDEX K 15.
2. Mix using a ½" (12 mm) heavy-duty drill (min. 650 rpm) with an ARDEX T-1 mixing paddle. Do not overwater. When mixing sanded materials, ARDEX recommends using the ARDEX DUSTFREE™ or a standard "gutter hook" vacuum attachment in combination with a wet/dry (Shop-Vac® style) vacuum and HEPA dust extraction vacuum system. Additionally, each bag should be handled with care and emptied slowly to avoid creating a plume of dust. Contact the ARDEX Technical Service Department for more details on ARDEX products and air quality management.
3. Aggregate mix: For areas to be installed over 1 ½" (4 cm) thick, aggregate may be added to reduce material costs. Mix ARDEX K 15® with water first, then add 1 part aggregate by volume of washed, well-graded 1/8" to 3/8" (3 to 9.5 mm) pea gravel. The aggregate size must not exceed 1/3 the depth of the pour. Do not use sand. Note: The addition of aggregate will diminish the workability of the product and may make it necessary to install a finish coat to obtain a smooth surface. Allow the initial application to dry for 12 to 16 hours, and then prime this layer with ARDEX P 51 mixed 1: 1 with water. Allow the primer to dry (min. 30 minutes, max. 24 hours) before installing the neat coat of ARDEX K 15.
4. For pump installations, ARDEX K 15® shall be mixed using the ARDEX ARDIFLO™ Automatic Mixing Pumps. Contact the ARDEX Technical Service Department (888) 5127339 for complete pump operation instructions.

E. Application: Comply with manufacturer's printed instructions and the following:

1. Installations over metal and other non-porous substrates should be limited to a thickness of ½" (12.7 mm) unless otherwise approved by the ARDEX Technical Services Department. For all other substrates, ARDEX K 15® must be installed at a minimum

thickness of 1/8" (3 mm) over the highest point in the floor, which typically results in an average thickness of 1/4" (6 mm) or more over the entire floor. ARDEX K 15® can be installed up to 1 1/2" (4 cm) over large areas neat, and up to 5" (12.7 cm) with the addition of proper aggregate. ARDEX K 15® can also be featheredged to match existing elevations. If a true featheredge is needed, ARDEX recommends using ARDEX FEATHER FINISH® for transitions.

2. Pour or pump the liquid ARDEX K 15® and spread into place with the ARDEX T-4 Spreader. Immediately use the ARDEX T-5 Smoother to smooth the surface. Wear nonmetallic cleats to avoid leaving marks in the liquid ARDEX K 15®.

F. Curing

1. ARDEX K 15® can be walked on in 2-3 hours. Moisture-insensitive tiles such as ceramic, quarry and porcelain can be installed after 6 hours. All other finish floor coverings can be installed after 16 hours at 70°F (21°C). For resinous systems such as epoxy and polyurethane floors please contact the ARDEX Technical Services Department.

3.3 FIELD QUALITY CONTROL

- A. Where specified, field sampling of the ARDEX underlayment is to be done by taking an entire unopened bag of the product being installed to an independent testing facility to perform compressive strength testing in accordance with ASTM C 109/modified: air-cure only. There are no in situ test procedures for the evaluation of compressive strength.

3.4 PROTECTION

- A. Prior to the installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, Masonite or other suitable protection course.

END OF SECTION

SECTION 055000 - 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 overhead doors.
 - 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 bollards.
- B. Related Requirements:
 - 1. Section 033000 "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 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.

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 metal fabrications that are anchored to or that receive other work. 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.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Steel framing and supports for overhead doors.
 - 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 bollards.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS

- 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.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- D. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- F. Zinc-Coated Steel Wire Rope: ASTM A 741.
 - 1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm) or as indicated.
2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33 (Grade 230), with G90 (Z275) coating; 0.079-inch (2-mm) nominal thickness.
3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, structural steel, Grade 33 (Grade 230) 0.0677-inch (1.7-mm) minimum thickness; hot-dip galvanized after fabrication.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 1. Provide stainless-steel fasteners for fastening aluminum.
 2. Provide stainless-steel fasteners for fastening stainless steel.
 3. Provide stainless-steel fasteners for fastening nickel silver.
 4. Provide bronze fasteners for fastening bronze.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- D. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- E. Post-Installed Anchors: Torque-controlled expansion anchors.
 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
- F. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting." & "Section 099123 Interior Painting."

- 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. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 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 (1 mm) 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 are 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.
- J. 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 (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.6 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. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
 - 1. Provide bearing plates welded to beams where indicated.
 - 2. Drill or punch girders and plates for field-bolted connections where indicated.
- D. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
 - 1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
 - 2. Unless otherwise indicated, provide $1/2$ -inch (12.7-mm) baseplates with four $5/8$ -inch (16-mm) anchor bolts and $1/4$ -inch (6.4-mm) top plates.
- E. Galvanize miscellaneous framing and supports where indicated.

2.7 PREFABRICATED BUILDING COLUMNS

2.8 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 and prime miscellaneous steel trim.

2.9 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe, steel shapes, as indicated.
- B. Fabricate sleeves for bollard anchorage from steel pipe or tubing with **1/4-inch- (6.4-mm-)** thick steel plate welded to bottom of sleeve. Make sleeves not less than **8 inches (200 mm)** deep and **3/4 inch (19 mm)** larger than OD of bollard.
- C. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or **1/4-inch (6.4-mm)** wall-thickness steel tubing with an OD approximately **1/16 inch (1.5 mm)** less than ID of bollards. Match drill sleeve and bollard for **3/4-inch (19-mm)** steel machine bolt.
- D. Prime bollards with zinc-rich primer.

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 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, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for overhead doors securely to, and rigidly brace from, building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING PREFABRICATED BUILDING COLUMNS

- A. Install prefabricated building columns to comply with AISC 360, "Specifications for Structural Steel Buildings," and with requirements applicable to listing and labeling for fire-resistance rating indicated.

3.4 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
 - 1. Do not fill removable bollards with concrete.
- B. Anchor bollards to existing construction with expansion anchors. Provide four **3/4-inch (19-mm)** bolts at each bollard unless otherwise indicated.
 - 1. Embed anchor bolts at least **4 inches (100 mm)** in concrete.
- C. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately **1/8 inch (3 mm)** toward bollard.
- D. Anchor bollards in place with concrete footings. Center and align bollards in holes **3 inches (75 mm)** above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- E. Fill bollards solidly with concrete, mounding top surface to shed water.
 - 1. Do not fill removable bollards with concrete.

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 (0.05-mm)** dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

SECTION 061000 - ROUGH 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. Framing with dimension lumber.
 2. Framing with timber.
 3. Rooftop equipment bases and support curbs.
 4. Wood blocking, cants, and nailers.
 5. Wood furring.
 6. Wood sleepers.
 7. Plywood backing panels.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.
- E. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 1. WCLIB: West Coast Lumber Inspection Bureau.
 2. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions 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.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include

physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
 1. Wood-preservative-treated wood.
 2. Engineered wood products.
 3. Shear panels.
 4. Power-driven fasteners.
 5. Post-installed anchors.
 6. Metal framing anchors.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
- B. Maximum Moisture Content of Lumber: **19 percent** unless otherwise indicated.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by

rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPAC2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPAC31 with inorganic boron (SBX).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: **Construction or No. 1** grade.
 - 1. Application: **All interior partitions.**
 - 2. Species:
 - a. Douglas fir-larch; WCLIB or WWPA.
- B. Load-Bearing Partitions: **No. 1** grade.
 - 1. Application: **Exterior walls and interior load-bearing partitions.**
 - 2. Species:
 - a. Douglas fir-larch; WCLIB or WWPA.
- C. Ceiling Joists: **No. 1** grade.
 - 1. Species:

- a. Douglas fir-larch; WCLIB or WWPA.
- D. Joists, Rafters, and Other Framing Not Listed Above: **No. 1** grade.
 - 1. Species:
 - a. Douglas fir-larch; WCLIB or WWPA.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
 - 6. Grounds.
- B. For items of dimension lumber size, provide No. 1 grade lumber with 19 percent maximum moisture content of any species.

2.5 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in

unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.7 METAL FRAMING ANCHORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Simpson Strong-Tie Co., Inc.
 2. Approved Equal.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 1. Use for interior locations where stainless steel is not indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install shear wall panels to comply with manufacturer's written instructions.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- G. Do not splice structural members between supports unless otherwise indicated.

- H. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- I. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
- J. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- K. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- L. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- M. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
- N. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of **2-inch nominal (38-mm actual)** thickness whose widths equal that of studs. Fasten plates to supporting construction unless otherwise indicated.
 1. For exterior walls, provide **2-by-6-inch nominal**-size wood studs spaced **16 inches** o.c. unless otherwise indicated.
 2. For interior partitions and walls, provide **2-by-6-inch nominal**-size wood studs spaced **16 inches** o.c. unless otherwise indicated.
 3. Provide continuous horizontal blocking at midheight of partitions more than **96 inches (2438 mm)** high, using members of **2-inch nominal (38-mm actual)** thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than **4-inch nominal (89-mm actual)** depth for openings **48 inches (1200 mm)** and less in width, **6-inch nominal (140-mm actual)** depth for openings **48 to 72 inches (1200 to 1800 mm)** in width, **8-inch nominal (184-mm actual)** depth for openings **72 to 120 inches (1800 to 3000 mm)** in width, and not less than **10-inch nominal (235-mm actual)** depth for openings **10 to 12 feet (3 to 3.6 m)** in width.

3.5 FLOOR JOIST FRAMING INSTALLATION

- A. General: Install floor joists with crown edge up and support ends of each member with not less than **1-1/2 inches (38 mm)** of bearing on wood or metal, or **3 inches (76 mm)** on masonry. Attach floor joists as follows:
 1. Where supported on wood members, by toe nailing or by using metal framing anchors.
 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds **48 inches (1200 mm)**.

- C. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than one-third depth of joist; do not locate closer than **2 inches (50 mm)** from top or bottom.
- D. Provide solid blocking of **2-inch nominal (38-mm actual)** thickness by depth of joist at ends of joists unless nailed to header or band.
- E. Lap members framing from opposite sides of beams, girders, or partitions not less than **4 inches (102 mm)** or securely tie opposing members together. Provide solid blocking of **2-inch nominal (38-mm actual)** thickness by depth of joist over supports.
- F. Provide solid blocking between joists under jamb studs for openings.
- G. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
 - 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- H. Provide bridging of type indicated below, at intervals of **96 inches (2438 mm)** o.c., between joists.
 - 1. Diagonal wood bridging formed from bevel-cut, **1-by-3-inch nominal- (19-by-64-mm actual-)** size lumber, double-crossed and nailed at both ends to joists.
 - 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.6 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
- B. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.7 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 064116 - 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. This Section includes the following:
 - 1. Plastic-laminate cabinets.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - 2. Division 06 Section "Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.

1.3 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated, including cabinet hardware and accessories.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures and other items installed in architectural woodwork.
 - 4. Apply WI-certified compliance label to first page of Shop Drawings.
- C. Samples for Initial Selection:
 - 1. Plastic laminates.
 - 2. PVC edge material.

1.5 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: Licensee of WI's Certified Compliance Program.
- C. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. Provide WI-certified compliance labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork 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 woodwork is 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 woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)" to fabricator of

architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of WI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
 - 3. Particleboard: ANSI A208.1, Grade M-2.
- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
 - a. Formica Corporation.
 - b. Wilsonart International; Div. of Premark International, Inc.
 - c. Approved equal.

2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware."
- B. Hinges: Blum 170 degree clip-type or approved equal:
 - 1. 1 pair for doors up to 42" high
 - 2. 1.5 pair for doors from 42" to 84" high
 - 3. 2 pair for doors over 84" high
- C. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, Stanley 4484 or approved equal.
- D. Catches: Magnetic catches, BHMA A156.9, B03141.
- E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081
- F. Drawer Slides: BHMA A156.9, B05091.
 - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
 - 2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
 - 3. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.

4. Pencil Drawer Slides: Grade 1; for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.
5. Keyboard Slides: Grade 1HD-100; for computer keyboard shelves.
6. Trash Bin Slides: Grade 1HD-200; for trash bins not more than 20 inches (500 mm) high and 16 inches (400 mm) wide.

G. Door Locks: BHMA A156.11, E07121.

H. Drawer Locks: BHMA A156.11, E07041.

I. Grommets for Cable Passage through Countertops: 2-1/2-inch (64-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Product: Subject to compliance with requirements, provide by Doug Mockett & Company, Inc.
2. Color: from manufacturer's full palette

J. 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.

K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.3 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- D. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

- C. 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. 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 indicated on Shop Drawings before disassembling for shipment.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, 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.

2.5 PLASTIC-LAMINATE CABINETS

- A. Quality Standard: Comply with WI Section 15.
- B. Grade: Custom
- C. WI Construction Style: Style A, Frameless.
- D. WI Construction Type: Type I, multiple self-supporting units rigidly joined together.
- E. WI Door and Drawer Front Style: Flush overlay.
- F. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: Grade HGS.
 - 2. Postformed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade HGS.
 - 4. Edges: PVC tape, 0.018-inch (0.460-mm) minimum thickness, matching laminate in color, pattern, and finish.
- G. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
 - a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch (0.460-mm) minimum thickness, matching laminate in color, pattern, and finish.
 - 2. Drawer Sides and Backs: Thermoset decorative panels.
 - 3. Drawer Bottoms: Thermoset decorative panels.
- H. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.
- I. 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.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- C. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E. 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 (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
- F. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, 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 woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064116

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic sheet paneling.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood furring for installing plastic paneling.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 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 MANUFACTURERS

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

2.2 PLASTIC SHEET PANELING

- A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following::
 - a. Marlite.
 - b. Approved equal.

2. Low-Emitting Materials: Paneling 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."
3. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
4. Product: Marlite FR.
5. Nominal Thickness: Not less than 0.09 inch (2.3 mm)
6. Panel Size: 4'x8', 4'x10', 4'x12'
7. Surface Finish: Textured
8. Color: Silver P-145

2.3 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: Silver P-145.
- B. Exposed Fasteners: Not permitted.
- C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.
- D. Adhesive: As recommended by plastic paneling manufacturer and with a VOC content of 50 g/L or less.

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 adhesive bond, including oil, grease, dirt, and dust.
- D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- E. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches (300 mm) 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
- 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. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.
- 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 066400

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Concealed building insulation.
- B. Related Sections include the following:
 - 1. Division 09 Section "Gypsum Board" for Sound Attenuation Blankets.

1.3 DEFINITIONS

- A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.4 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 insulation products.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers:
 - 1. CertainTeed Corporation.
 - 2. Owens Corning.
 - 3. Approved equal.
- B. Unfaced, Glass-Fiber 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; passing ASTM E 136 for combustion characteristics.
- C. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.
- D. Thickness: As required to fill the cavity between framing members; match depth of framing members.

2.3 INSULATION FASTENERS

- A. As recommended by the insulation manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated 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. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, 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.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- 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.
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, 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 (76-mm) clearance of insulation around recessed lighting fixtures.

3.5 PROTECTION

- A. Protect installed insulation 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.

END OF SECTION 072100

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Formed Products:
 - a. Formed low-slope roof sheet metal fabrications.
 - b. Formed equipment support flashing.
- B. Related Sections:
 - 1. Division 06 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.

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 roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
 - 1. Wind Zone 1: For velocity pressures of 10 to 20 lbf/sq. ft. (0.48 to 0.96 kPa): 40-lbf/sq. ft. (1.92-kPa) perimeter uplift force, 60-lbf/sq. ft. (2.87-kPa) corner uplift force, and 20-lbf/sq. ft. (0.96-kPa) outward force.
 - 2. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft. (1.00 to 1.44 kPa): 60-lbf/sq. ft. (2.87-kPa) perimeter uplift force, 90-lbf/sq. ft. (4.31-kPa) corner uplift force, and 30-lbf/sq. ft. (1.44-kPa) outward force.
- C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

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 expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 7. Details of special conditions.
 8. Details of connections to adjoining work.
 9. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Qualification Data: For qualified fabricator.
- D. Warranty: Sample of special warranty.

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. Copper Sheet Metal Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

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. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
 1. Non-Patinated Exposed Finish: Mill.

2.2 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
 - b. Approved equal.

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 unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, 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.
 - 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.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Copper Sheet: Copper, hardware bronze or Series 300 stainless steel.
 - 3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:
 - 1. For Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
 - 2. 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. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

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.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. [Fry Reglet Corporation](#).
 - b. Approved equal.
 - 2. Material: Galvanized steel, 0.022 inch (0.56 mm) 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.

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 (6 mm in 6 m)** on slope and location lines as indicated and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with butyl sealant concealed within joints.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof-Edge Flashing and Fascia Cap: See Section 075419. Roof edge flashing to match roof membrane.
- B. Copings: Fabricate in minimum **length to suit each condition**, but not exceeding **10-foot- (3-m-)** 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: See Drawings.
 - 2. Fabricate from the following materials:
 - a. Copper: **20 oz./sq. ft. thick)** where indicated on the Drawings.
 - b. Galvanized Steel: 24 gauge thick, where indicated on Drawings.
- C. Base Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 24 gauge thick.

- D. Counterflashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 24 gauge thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: **0.028 inch (0.71 mm)** thick.

2.7 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: **0.028 inch (0.71 mm)** 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. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than **6 inches (150 mm)** staggered **24 inches (600 mm)** between courses. Overlap side edges not less than **3-1/2 inches (90 mm)**. Roll laps with roller. Cover underlayment within 14 days.

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. Space cleats not more than **12 inches (300 mm)** apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.

7. 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. Coat back side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. 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 (3 m) with no joints allowed within 24 inches (600 mm) 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 (25 mm) deep, filled with sealant concealed within joints.
 - D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
 - 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 (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), 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 (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "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 (38 mm), 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.
 2. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.
- ### 3.4 ROOF FLASHING INSTALLATION
- A. General: Install sheet metal flashing and trim to comply with performance requirements 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. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.
 - C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
 - D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

- E. 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 (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant. Secure in a waterproof manner.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with [elastomeric] [butyl] sealant and clamp flashing to pipes that penetrate roof.

3.5 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.

3.6 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.7 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 076200

SECTION 078413 - 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. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items:
 - 1. Floors
 - 2. Walls and Partitions
- B. Related Sections include the following:
 - 1. Division 22 and 23 Sections specifying duct and piping penetrations.
 - 2. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop 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 construction penetrated.
 - 1. Fire-resistance-rated walls including fire walls and fire partitions.
 - 2. Fire-resistance-rated horizontal assemblies including floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:
 - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - 2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance-rated shaft enclosures.

- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - 2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- C. Qualification Data: For Installer.
- D. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.
- E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing through-penetration firestop 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.

- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is **UL, OPL ITS**, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated on Drawings.
- B. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application that are produced by one of the following manufacturers:
 1. A/D Fire Protection Systems Inc.
 2. Grace, W. R. & Co. - Conn.
 3. Hilti, Inc.
 4. Johns Manville.
 5. Nelson Firestop Products.
 6. NUCO Inc.
 7. RectorSeal Corporation (The).
 8. Specified Technologies Inc.
 9. 3M; Fire Protection Products Division.
 10. Tremco; Sealant/Weatherproofing Division.
 11. USG Corporation.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 1. Permanent forming/damming/backing materials, including the following:

- a. Slag-/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. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. 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.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. 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 nonshrinking, homogeneous mortar.
- I. 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.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

- K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system 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 work.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system 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 through-penetration firestop systems.
 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. 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 through-penetration firestop 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 through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to

remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing 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 firestop systems.
- C. Install fill materials for firestop systems 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 Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:
 - 1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system 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 through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 079200 - 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. Elastomeric joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. 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.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

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.

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. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Immersion in Liquids: Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Surfaces:
 - 1. Products:
 - a. Sonneborn, Division of ChemRex, Inc.; Sonolastic 150
 - b. Approved equal
 - 2. Finish: Suitable for painting

2.3 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), Type O (open-cell material), Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, 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.

2.4 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 Nonsag 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.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Louvers installed in hollow metal doors.
3. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 08 Section "Flush Wood Doors".
2. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
3. Division 08 Section "Door Hardware".
4. 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 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of anchorages, joints, field splices, and connections.
 - 6. Details of accessories.
 - 7. Details of moldings, removable stops, and glazing.
 - 8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
 - 1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.4 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, 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 NFPA 252 (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.

1.5 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.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 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.

1.8 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 products by one of the following:
 - 1. CECO Door Products; an Assa Abloy Group company.
 - 2. Curries Company; an Assa Abloy Group company.
 - 3. Steelcraft; an Allegion company.

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 STANDARD 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.
- B. 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: Level 3 and Physical Performance Level A (Extra Heavy Duty) Model 1 (Full Flush).
 - 2. Door Face: 16 gauge steel sheet.
 - 3. Core Construction: Manufacturer's standard vertical steel-stiffener core. Minimum 22 gauge steel-stiffeners at 6 inches on-center construction attached by spot welds spaced not more than 5" on centers. Spaces between stiffeners filled with fiberglass insulation (minimum density 0.8#/cubic ft.).
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - 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 ENERGY-EFFICIENT HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design specified, 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. Energy Efficient Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.
 - 1. Design: Level 3 and Physical Performance Level A (Extra Heavy Duty) Model 1 (Full Flush).
 - 2. Core Construction: Foamed in place polyurethane and steel stiffened laminated core with no stiffener face welds, in compliance with HMMA 867 "Laminated Core".

- a. Minimum 22 gauge steel stiffeners at 6 inches on-center internally welded at 5" on-center to integral core assembly, foamed in place polyurethane core chemically bonded to all interior surfaces. No stiffener face welding is permitted.
 - b. Thermal properties to rate at a fully operable minimum U-Factor 0.29 and R-Value 3.4, including insulated door, thermal-break frame and threshold.
- 3. Door Face: 16 gauge steel sheet.
- 4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. 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".
- 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

2.5 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames, with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
 - 3. Frames for Steel Doors: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
 - 4. Frames for openings up to 48 inches in width: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.]
 - 5. Frames for openings 48 inches and wider in width: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.]
 - 6. Frames for Wood Doors: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.
 - 7. Frames for Borrowed Lights: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.
- C. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.6 ENERGY-EFFICIENT HOLLOW METAL FRAMES

- A. Weatherstripped Frames: Subject to the same compliance standards and requirements as standard hollow metal frames, provide where indicated weatherstripped profiles with 1/8" integral kerf formed into the frame soffit able to receive manufacturer's listed gasket material. Available for use in both masonry and drywall construction, with fire rating up to 3 hours complying with NFPA 105, UL 1784, and ASTM E-283 Test criteria.

2.7 FRAME ANCHORS

- A. Jamb Anchors:

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.
- 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.

2.8 LOUVERS

A. Metal Louvers:

1. Manufacturer:
 - a. Wonder Metals Corp.
 - b. Anemostat: a Mestek company.
 - c. Approved Equal.
 2. Blade Type: Vision-proof, inverted V.
 3. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, factory primed for paint finish.
- 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. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, factory primed for paint finish.

2.9 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.
- E. Glazing: Comply with requirements in Division 08 Section "Glazing" and with the hollow metal door manufacturer's written instructions.
1. Factory Glazing: Factory install glazing in doors as indicated. Doors with factory installed glass to include all of the required glazing material.

2.10 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.

2.11 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 weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 - 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 joints continuously through full throat width of frames, including rabbets, soffits, and stops; 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 o.c. 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 weatherstripped 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".
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- 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.

2.12 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 squareness, alignment, twist, and plumbness.
- 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.

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, 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.

END OF SECTION 081113

SECTION 081416 - 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. Shop priming flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Requirements:
 - 1. Section 099123 "Interior Painting" for field finishing doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings.
- B. 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.
- C. Samples for Verification:
 - 1. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
 - a. Provide Samples for each species of veneer and solid lumber required.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 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.

1.7 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 (6.4 mm)** in a **42-by-84-inch (1067-by-2134-mm)** section.
 - b. Telegraphing of core construction in face veneers exceeding **0.01 inch in a 3-inch (0.25 mm in a 76.2-mm)** 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. Haley Brothers, Inc.
 - 2. Marlite.
 - 3. Marshfield DoorSystems, Inc.
 - 4. Approved Equal
- 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 AWI's, AWMAC's, and WI's "Architectural Woodwork Standards.

1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
- B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 2. Pairs: Provide formed-steel edges and astragals with intumescent seals.
 - a. Finish steel edges and astragals with baked enamel same color as doors.
 - b. Finish steel edges and astragals to match door hardware (locksets or exit devices).
- C. Particleboard-Core Doors:
1. Particleboard: ANSI A208.1, Grade LD-2.
 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
 - b. 5-inch (125-mm) bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 3. Provide doors with [glued-wood-stave] [or] [structural-composite-lumber] cores instead of particleboard cores for doors indicated to receive exit devices.

2.3 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors

1. Grade: Custom.
2. Faces: Hardboard.
3. Exposed Vertical Edges: Any closed-grain hardwood.
4. Core: Particleboard
5. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
6. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 LIGHT FRAMES AND LOUVERS

- A. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

B. Metal Louvers:

1. Manufacturer:
 - a. Wonder Metals Corp.
 - b. Anemostat: a Mestek company.
 - c. Approved Equal.
2. Blade Type: Vision-proof, inverted V.

3. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, factory primed for paint finish.
- C. 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. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, 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.
 2. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- B. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated (fire rated where indicated on drawings)
 2. Louvers: Factory install louvers in prepared openings.

2.6 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 099123 "Interior Painting."
- B. Doors for Transparent Finish: Shop prime faces and all four edges with stain (if required), other required pretreatments, and first coat of finish as specified in Section 099300 "Staining and Transparent Finishing." Seal edges of cutouts and mortises with first coat of finish.

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 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. 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 (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) 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 (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

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 081416

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes aluminum windows for exterior locations.
- B. Related Requirements:
 1. Section 084113 "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.
 2. Section 088000 "Glazing"

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters, and protecting finishes.
 4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION 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, hardware, accessories, insect screens, operational clearances, 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 (50 by 100 mm)** in size.
- D. Samples for Initial Selection: For units with factory-applied color finishes.
 1. Include similar Samples of hardware and accessories involving color selection.

- E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's warranties.

1.6 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.
- 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 typical wall area as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 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: Five (5) years from date of Substantial Completion.
 - b. Glazing Units: Five (5) years from date of Substantial Completion.
 - c. Aluminum Finish: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer:
 - 1. Milgard Windows & Doors
 - 2. All Weather Architectural Aluminum, Inc.
 - 3. Approved Equal.
- B. System:
 - 1. Milgard Windows & Doors – 710 Series
- C. 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. Sound Transmission Class (STC): Rated for not less than 35 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

2.3 ALUMINUM WINDOWS

- A. Operating Types: Provide the following operating types in locations indicated on Drawings:
 - 1. Sliding.
 - 2. Fixed.
- B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 1. Material: 6063 extruded aluminum
 - 2. T-5 Rating for strength and durability.
 - 3. Integral extrusion walls
 - a. Web thickness: 0.125"
 - b. Wall thickness: 0.094"
 - c. Nailing fins: 0.062"
 - 4. Construction:
 - a. Corners of frame and Ventilators: Mitered and welded.
 - b. Muntin and Intermediate Bars: Firmly attached to their cross joints and abutting sash sections.
 - c. Frame Sill: Slope to exterior, provide weep provisions.
 - d. Channel Frame Components: See Drawings.
- C. Insulating-Glass Units: ASTM E 2190.
 - 1. Glass: ASTM C 1036, Type 1, Class 1, q3.
 - a. Tint: Clear.

- b. Kind: Fully tempered where indicated on Drawings.
- 2. Lites: As indicated on Drawings.
- 3. Filling: Fill space between glass lites with argon.
- 4. Low-E Coating: Pyrolytic on second surface.
- 5. See Section 088000 "Glazing" for additional requirements.
- D. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.
- E. Projected Window Hardware:
 - 1. Hinges: 4-bar heavy duty stainless steel.
 - 2. Lock: Lever handle and cam-action lock with pole ring.
 - 3. Limit Devices: Concealed friction adjustor, adjustable stay bar limit devices designed to restrict sash opening.
 - a. Limit clear opening to 6 inches (150 mm) for ventilation; with custodial key release.
 - 4. Pole Operators: Tubular-shaped anodized aluminum; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate window without reaching more than 60 inches (1500 mm) above floor; one pole operator and pole hanger per room that has operable windows more than 72 inches (1800 mm) above floor.
- F. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
 - 1. Santoprene, 64A durometer black bulb insert into extruded slot, 2 rows.
- G. 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 INSECT SCREENS

- A. Per Manufacturers recommendations.

2.5 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. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

- F. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- G. 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.

2.6 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.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. High-Performance Organic Finish (Three-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coatings; Organic Coating: manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from full range of industry colors and color densities.

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.
- B. 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.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
 - 1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
 - 2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
 - b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
 - 3. Water-Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
 - 4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
 - 5. Test Reports: Prepared according to AAMA 502.
- C. Remove and replace non-complying windows and retest as specified above.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. 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.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. 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 085113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Mechanical door hardware for the following:
 - a. Swinging doors.
- 2. Cylinders for door hardware specified in other Sections.
- 3. Electrified door hardware.

- B. Related Requirements:

- 1. Section 081113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
- 2. Section 081213 "Hollow Metal Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
- 3. Section 081416 "Flush Wood Doors" for astragals provided as part of labeled fire-rated assemblies.

1.3 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

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.
- B. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 - 2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
 - 3. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - e. Fastenings and other installation information.
 - f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
 - g. Mounting locations for door hardware.
 - h. List of related door devices specified in other Sections for each door and frame.
- C. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
- B. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- C. Keying Conference: The owner will work directly with the lock manufacturer to create the permanent keying configuration and hierarchy. At the earliest possible time, the contractor is to inform the owner of dates when this information must be finalized in order to maintain the contractor's schedule.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
 - a. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.
 - 1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is 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.
- B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of **0.3 cfm/sq. ft. (3 cu. m per minute/sq. m)** at the tested pressure differential of **0.3-inch wg (75 Pa)** of water.
- C. Means of Egress Doors: Latches do not require more than **15 lbf (67 N)** to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with 2013 California Building Code.
 - 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 lbf (22.2 N)**.
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: **5 lbf (22.2 N)** applied perpendicular to door.
 - b. Sliding or Folding Doors: **5 lbf (22.2 N)** applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than **1/2 inch (13 mm)** high.
 - 4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
 - 5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

2.4 HINGES, GENERAL

- A. Quantity: Provide the following, unless otherwise indicated:
 - 1. Two Hinges: For doors with heights up to 60 inches (1524 mm).
 - 2. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
 - 3. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).
 - 4. For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).
- B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- C. Hinge Base Metal: Unless otherwise indicated, provide the following:
 - 1. Exterior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
 - 2. Interior Hinges: Steel, with steel pin.
 - 3. Hinges for Fire-Rated Assemblies: Steel, with steel pin.
- D. Hinge Options:
 - 1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed. Provide one per door leaf at:
 - a. Each outswinging exterior door
 - b. Each outswinging corridor door with locks.
 - 2. Corners: Square.
- E. Fasteners: Comply with the following:
 - 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 - 2. Wood Screws: For wood doors and frames.
 - 3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
 - 4. Screws: Phillips flat-head. Finish screw heads to match surface of hinges.
- F. Size: 4-1/2" x 4-1/2" unless otherwise noted.

2.5 HINGES

A. Hinges: BHMA A156.1.

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. McKinney Products Company; an ASSA ABLOY Group company.
 - b. Stanley Commercial Hardware; Div. of The Stanley Works.
 - c. Approved equal.

2.6 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.

C. Lock Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

D. Lock Trim:

1. Levers: Schlage "Sparta" or equal.
2. Escutcheons (Roses): Wrought.
3. Dummy Trim: Match lever lock trim and escutcheons.
4. Operating Device: Lever with escutcheons (roses).

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

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: Manufacturer's special strike box fabricated for aluminum framing.
4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.

1. Manufacturers and type:
 - a. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - b. Type: Schlage ND- series

2.7 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.

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. IVES Hardware; an Ingersoll-Rand company.
 - b. Trimco.
 - c. Approved equal.

2.8 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

- A. Automatic and Self-Latching Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.
 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. IVES Hardware; an Ingersoll-Rand company.
 - b. Trimco.
 - c. Approved equal.

2.9 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
 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. Von Duprin; an Ingersoll-Rand company.
 - b. Approved equal.
- B. Removable Mullions: BHMA A156.3.
- C. Outside Trim: Pull with cylinder; material and finish to match locksets, unless otherwise indicated.
- D. Through Bolts: For exit devices and trim on metal doors, non-fire-rated wood doors, fire-rated wood doors.
- E. Strikes: Manufacturer's standard strike, finished to match door hardware set.

2.10 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 1. Manufacturer: Same manufacturer as for locking devices.
 2. Type: Schlage "Primus" cylinders to match existing.

- B. Standard Lock Cylinders: BHMA A156.5; Grade 1; permanent cores that are interchangeable; face finished to match lockset.
- C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.11 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - 1. The owner will provide specific keying protocol directly to the manufacturer or their designated representative.
 - 2. The contractor will include the cost to furnish 15 key blanks to owner for their keying directly with manufacturer.
 - 3. Cylinder change keys: Provide 2 to the owner.

2.12 OPERATING TRIM

- A. Operating Trim: BHMA A156.6.
 - 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. IVES Hardware; an Ingersoll-Rand company.
 - b. Trimco.
 - c. Approved equal.

2.13 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.
- B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
- C. Astragals: BHMA A156.22.

2.14 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

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. LCN Closers; an Ingersoll-Rand company.
 - b. Approved equal.

2.15 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16.

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. IVES Hardware; an Ingersoll-Rand company.
 - b. Trimco.
 - c. Approved equal.

2.16 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

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. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - b. Approved equal.

2.17 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening 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. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - b. Approved equal.

2.18 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick; with manufacturer's standard machine or self-tapping screw fasteners.

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. IVES Hardware; an Ingersoll-Rand company.
 - b. Trimco.
 - c. Approved equal.
- 2. Size: 1-1/2 inches (38 mm) less than door width on push side and 1/2 inch (13 mm) less than door width on pull side, by height specified in door hardware sets.

2.19 MISCELLANEOUS DOOR HARDWARE

- A. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.
 - 1. Manufacturer and type:
 - a. Trimco
 - 1) Type 1229A for metal frames
 - 2) Type 1229B for wood frames
- B. Provide at all door frames except those with head and jamb gasketing.

2.20 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
 - 2) Strike plates to frames.

- 3) Closers to doors and frames.
- b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
- 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
- 4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
- 5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.21 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- 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.
- D. Hardware Finish: BHMA 626 unless otherwise noted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's 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. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every **30 inches (750 mm)** of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every **30 inches (750 mm)** of door height greater than **90 inches (2286 mm)**.
- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.
- F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- G. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain door hardware.

3.7 HARDWARE SCHEDULE LEGEND

- A. Designations:
 - 1. Stanley (STN)
 - 2. Schlage (SCH)
 - 3. LCN (LCN)
 - 4. Trimco (TBM)
 - 5. Pemko (PEM)
 - 6. Von Duprin (VON)

3.8 DOOR HARDWARE SETS

- A. Group A: Entry, Exterior, Single

1.	3 ea. Butts	FBB191	(STN)
2.	1 ea. Lockset	ND92JD	(SCH)
3.	1 ea. Exit Device	CD9947NLx697NL	(VON)
4.	1 ea. Cylinder	23-030	(SCH)
5.	1 ea. Closer	4040XP	(LCN)
6.	1 ea. Threshold	271A	(PEM)
7.	1 Set Gaskets	S88D	(PEM)
8.	1 ea. Stop	1209HO	(TBM)
9.	1 ea. Rain Drip	346	(PEM)
- B. Group B: Interior, Single

1.	3 ea. Butts	FBB191	(STN)
2.	1 ea. Lockset	ND92JD	(SCH)

	3.	1 ea. Door Bottom	215V	(PEM)
	4.	1 ea. Cylinder	23-030	(SCH)
	5.	1 set Gaskets	S88D	(PEM)
	6.	1 ea. Stops	1211	(TBM)
C.	Group C: Interior, Single			
	1.	3 ea. Butts	FBB191	(STN)
	2.	1 ea. Lockset	ND94JD	(SCH)
	3.	1 ea. Cylinder	23-030	(SCH)
	4.	1 set Gaskets	S88D	(PEM)
	5.	1 ea. Stops	1211	(TBM)
D.	Group D: Storage, Single			
	1.	3 ea. Butts	FBB191	(STN)
	2.	1 ea. Lockset	ND92PD	(SCH)
	3.	1 ea. Cylinder	23-740	(SCH)
	4.	1 set Gaskets	S88D	(PEM)
E.	Group H: Passage, Interior, Single			
	1.	3 ea. Butts	FBB191	(STN)
	2.	1 ea. Lockset	ND40S	(SCH)
	3.	1 set Gaskets	S88D	(PEM)
	4.	1 ea. Stops	1205	(TBM)
F.	Group A: Entry, Exterior, Single			
	1.	3 ea. Butts	FBB191	(STN)
	2.	1 ea. Lockset	ND92JD	(SCH)
	3.	1 ea. Cylinder	23-030	(SCH)
	4.	1 ea. Closer	4040XP	(LCN)
	5.	1 ea. Door Bottom	215V	(PEM)
	6.	1 Set Gaskets	S88D	(PEM)
	7.	1 ea. Stop	1211	(TBM)

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Glass for windows, doors, interior borrowed lites, storefront framing & glazed curtain walls.
 - 2. Glazing sealants and accessories.
- B. Related Requirements:
 - 1. Section 088813 "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: 2016 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 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of the following products; 12 inches (300 mm) square.
 - 1. Tinted glass.

- 2. Coated glass.
- 3. Insulating glass.

- C. Glazing Accessory Samples: For sealants, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For glass.
- C. Product Test Reports: For insulating glass, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Sample Warranties: For special warranties.

1.8 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.
- B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.9 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.

1.10 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 (4.4 deg C).

1.11 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: Ten (10) years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for 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: Ten (10) years from date of Substantial Completion.
- C. 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: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1. PPG Industries.
 - 2. Pilkington North America, Inc.
 - 3. Approved Equal.
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
 - 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 IBC and ASTM E 1300.
 - 1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade 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 (25 mm), whichever is less.

3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with basic-protection testing requirements in ASTM E 1996 for Wind Zone I when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.
 1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
 2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.
 - D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
 - E. 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 of thickness indicated.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 6. 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. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. 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 is indicated, 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 annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. 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. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.
- C. 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.
- D. Pyrolytic-Coated, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

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, approved by Architect.
 - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Field-applied sealants shall have a VOC content of not more than 250 g/L.
 - 4. Sealants 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."
 - 5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 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 sealant or 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).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 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.
- 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 (1270 mm).
 - 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 (3-mm) 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 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, then to jambs. Cover horizontal framing joints by applying tapes to jambs, 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. 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.

3.6 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 and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. 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 wash away 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. 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.

3.8 MONOLITHIC GLASS SCHEDULE

- A. Glass Type 1: Clear, annealed, fully tempered float glass.
 - 1. Minimum Thickness: ¼" minimum.
- B. Glass Type 2: Low-E-coated, clear insulating glass (Tempered)
 - 1. Overall Unit Thickness: 1 inch (25 mm).
 - 2. Minimum Thickness of Each Glass Lite: ¼" minimum.
 - 3. Outdoor Lite: Annealed, Fully Tempered float glass.
 - 4. Interspace Content: Air.
 - 5. Indoor Lite: Annealed, Fully Tempered float glass.
 - 6. Low-E Coating: Sputtered on second surface.

7. Winter Nighttime U-Factor: 0.29 maximum.
8. Summer Daytime U-Factor: 0.27 maximum.
9. Visible Light Transmittance: 70 percent minimum.
10. Solar Heat Gain Coefficient: 0.39 maximum.

END OF SECTION 088000

SECTION 089119 - FIXED LOUVERS

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. Fixed, **extruded-aluminum** louvers.
- B. Related Requirements:
 - 1. Section 081113 "Hollow Metal Doors and Frames" for louvers in hollow-metal doors.
 - 2. Section 099113 "Exterior Painting" for field painting louvers.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- D. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.

- C. Samples: For each type of metal finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
 - a. .
- B. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**.
 1. Design earthquake spectral response acceleration, short period (Sds) for Project is 1.502 .
 2. Component Importance Factor: **1.0**.

- C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): **120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.**
- E. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Wind-Driven-Rain-Resistant Louver <**Insert drawing designation**>:
 - 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. Wonder Metals Corp.
 - b. Approved Equal.
 - 2. Louver Depth: **4 inches (100 mm).**
 - 3. Frame and Blade Nominal Thickness: Not less than **0.080 inch (2.03 mm).**
 - 4. Louver Performance Ratings:
 - a. Free Area: Not less than 45 percent.
 - b. Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **1,170-fpm** free-area **intake** velocity.
 - c. Wind-Driven Rain Performance: Not less than **99** percent effectiveness.
 - 5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

- A. General: Provide screen at **each exterior louver**.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: **Insect screening.**
- B. Secure screen frames to louver frames with **machine screws with heads finished to match louver**, spaced a maximum of **6 inches (150 mm)** from each corner and at **12 inches (300 mm)** o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same type and form of metal as indicated for louver to which screens are attached. **Reinforce extruded-aluminum screen frames at corners with clips.**
 2. Finish: **Same finish as louver frames to which louver screens are attached.**
 3. Type: **Rewirable frames with a driven spline or insert.**
- D. Louver Screening for Aluminum Louvers:
1. Insect Screening: Aluminum, **18-by-16 (1.4-by-1.6-mm)** mesh, **0.012-inch (0.30-mm)** wire.

2.5 MATERIALS

- A. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
1. Use **Phillips flat-head** screws for exposed fasteners unless otherwise indicated.
 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 3. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.
 4. For fastening stainless steel, use 300 series stainless-steel fasteners.
 5. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed for masonry, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
1. Horizontal Mullions: Provide horizontal mullions at joints **unless continuous vertical assemblies are indicated.**
- C. Maintain equal louver blade spacing, **including separation between blades and frames at head and sill**, to produce uniform appearance.

- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: **Exterior flange** unless otherwise indicated.
- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or **72 inches (1830 mm)** o.c., whichever is less.
 - 1. Exterior Corners: Prefabricated corner units with mitered **and welded blades** and with **fully recessed** mullions at corners.
- G. Provide **subsills made of same material as louvers** for recessed louvers.
- H. Join frame members to each other and to fixed louver blades with fillet welds **concealed from view, threaded fasteners, or both, as standard with louver manufacturer** unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. Conversion-Coated and Factory-Primed Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, 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. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION 089119

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
 - 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

- B. Related Requirements:

- 1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, 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.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, but are not limited to, the following:
 - 1. Clark Western Building Systems, Inc.
 - 2. Dietrich Metal Framing; a Worthington Industries Company.
 - 3. SCAFCO Corporation
 - 4. Steel Network, Inc. (The).

2.3 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653, G60, hot-dip galvanized unless otherwise indicated.
- B. Studs and Runners: ASTM C 645.
 - 1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.033 inch or as indicated on the drawings.
 - b. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 - 2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. 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.
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: As indicated on Drawings 0.033 inch.
- F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch wide flanges.
 - 1. Depth: As indicated on Drawings.
 - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base-Metal Thickness: 0.033 inch.
 - 2. Depth: As indicated on the Drawings.
- H. Resilient Furring Channels: 1/2-inch deep, steel sheet members designed to reduce sound transmission.
 - 1. Configuration: hat shaped.
- I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch wide flanges.
 - 1. Depth: 3/4 inch minimum or as indicated on the drawings.
 - 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
 - 3. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.

- J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

2.4 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
 - a. Type: Postinstalled, expansion anchor.
 - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- C. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch wide flanges.
 - 1. Depth: 2-1/2 inches or as indicated on the drawings.
- F. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch wide flanges, 3/4 inch deep.
 - 2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.033 inch.
 - b. Depth: As indicated on Drawings.
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base-Metal Thickness: 0.033 inch.
 - 4. Resilient Furring Channels: 1/2-inch deep members designed to reduce sound transmission.
 - a. Configuration: hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Manufactures: Subject to compliance with requirements, but not limited to the following:
 - a. Armstrong World Industries.
 - b. United States Gypsum Company.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.

2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Single-Layer Application: 24 inches o.c. unless otherwise indicated.
 2. Multilayer Application: 24 inches o.c. unless otherwise indicated.
 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

- a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c unless indicated otherwise.
- E. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Furring Members:
 - 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-furring members spaced 24 inches o.c.
 - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G. 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.

3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Hangers: 48 inches unless indicated otherwise.
 - 2. Carrying Channels (Main Runners): 48 inches unless indicated otherwise.
 - 3. Furring Channels (Furring Members): 16 inches.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

- a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
- 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
- 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
- 5. Do not attach hangers to steel roof deck.
- 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
- 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
- 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems as indicated.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Exterior gypsum board for ceilings and soffits.
 - 3. Tile backing panels.
 - 4. Texture finishes.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in **12-inch-** (300-mm-) long length for each trim accessory indicated.
 - 2. Textured Finishes: 12-inch by 12-inch for each textured finish indicated and on same backing indicated for Work.

1.4 QUALITY ASSURANCE

- A. Mockups: Before beginning gypsum board installation, install mockups of at least **100 sq. ft.** (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - b. Each texture finish indicated.
 - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 - 3. Simulate finished lighting conditions for review of mockups.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

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. Manufacturer:
 - 1. National Gypsum Company.
 - 2. United States Gypsum Company.
 - 3. Approved Equal.

- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch (15.9 mm) unless otherwise noted.
 - 2. Long Edges: Tapered.
- C. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch (15.9 mm).
 - 2. Long Edges: Tapered.
- D. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
 - 1. Thickness: 1/4 inch (6.4 mm).
 - 2. Long Edges: Tapered.
- E. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch (15.9 mm) unless otherwise noted.
 - 2. Long Edges: Tapered.
- F. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M.
 - 1. Core: 5/8 inch (15.9 mm), Type X.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
 - 4. Hard Body Impact Resistance: Level 3
- G. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: 5/8 inch (15.9 mm), Type X.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

- A. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
 - 1. Manufacturer:
 - a. National Gypsum Company.
 - b. United States Gypsum Company.
 - c. Approved Equal.
 - 2. Core: 5/8 inch (15.9 mm), Type X.
- B. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.
 - 1. Manufacturer:
 - a. Georgia-Pacific; DensGlass Sheathing.
 - b. Approved Equal.
 - 2. Core: As indicated on Drawings.

2.5 TILE BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
 - 1. Manufacturer:
 - a. National Gypsum Company.
 - b. United States Gypsum Company.
 - c. Approved Equal.
 - 2. Core: 5/8 inch (15.9 mm), Type X.

2.6 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. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. See Drawings for additional shapes and profiles.

2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 3. 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 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.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
- D. Joint Compound for Exterior Applications:
 - 1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - 2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
- E. Joint Compound for Tile Backing Panels:
 - 1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick.
- C. 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.
- D. 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. See Section 079219 "Acoustical Joint Sealants".
- E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
- F. Vapor Retarder: As specified in Section 072100 "Thermal Insulation."

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 (1.5 mm)** 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. (0.7 sq. m) 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- (6.4- to 9.5-mm-) 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- (6.4- to 12.7-mm-) 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. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. 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.
- K. 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. Wallboard Type: Vertical surfaces unless otherwise indicated.
 - 2. Type X: As indicated on Drawings & where required for fire-resistance-rated assembly.
 - 3. Flexible Type: Apply in double layer at curved assemblies.
 - 4. Abuse-Resistant Type: As indicated on Drawings.
 - 5. Moisture- and Mold-Resistant Type: As indicated on Drawings.
- 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 horizontally (perpendicular 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 stairwells and other 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.

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 (400 mm) 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.

D. Curved Surfaces:

- 1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves and tangent to them.
- 2. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
 - 1. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations.
 - 2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

- A. Water-Resistant Backing Board: Install where indicated with 1/4-inch (6.4-mm) 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.

3.6 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. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges.
- C. Exterior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges.

3.7 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 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 where indicated.
 - 2. Level 2: Panels that are substrate for tile or acoustical tile.
 - 3. Level 5: At panel surfaces that are exposed to view.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

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 splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 096513 - RESILIENT BASE AND 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. Resilient base.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.

- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Resilient Base:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Approved equal.
- B. Resilient Base Standard: ASTM F 1861.
 - 1. Material Requirement: Rubber.
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - 3. Style: Cove (base with toe).
- C. Minimum Thickness: 0.125 inch (3.2 mm).
- D. Height: 4 inches (102 mm).
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Job formed or preformed.
- H. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
 - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Cove Base Adhesives: Not more than 50 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.

- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 - 1. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products until Substantial Completion.
- E.

END OF SECTION 096513

SECTION 096516 – RESILIENT SHEET FLOORING

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 the following:
 - 1. Sheet vinyl floor coverings.

1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Shop Drawings: Show location of seams and edges. Indicate location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutout locations.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of sections of units showing the full range of colors and patterns available for each type of product indicated.
- D. Product Certificates: Signed by manufacturers of sheet vinyl floor coverings certifying that each product furnished complies with requirements.
- E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- F. Maintenance Data: For sheet vinyl floor coverings to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an installer who is competent in the technique required by manufacturer for heat-welding seams.
 - 1. Engage installers who are certified by floor covering manufacturer for heat-welded seam installation.
- B. Source Limitations: Obtain each type, color, and pattern of sheet vinyl floor covering specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet vinyl floor coverings and installation accessories to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).
- C. Store rolls upright.
- D. Move sheet vinyl floor coverings and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

- A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive sheet vinyl floor coverings for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- B. Do not install sheet vinyl floor coverings until they are at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during sheet vinyl floor covering installation and for time period after installation recommended in writing by manufacturer.
- D. Install sheet vinyl floor coverings and accessories after other finishing operations, including painting, have been completed.
- E. Where demountable partitions and other items are indicated for installation on top of sheet vinyl floor coverings, install floor coverings before these items are installed.
- F. Do not install sheet vinyl floor coverings over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by floor covering manufacturer's recommended bond and moisture test.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, sheet vinyl floor coverings that may be incorporated into the Work include, but are not limited to:
 - 1. Armstrong, Connection Corlon
 - 2. Approved equal.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by floor covering manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit sheet vinyl floor covering and substrate conditions indicated.
- C. Heat-Welding Bead: Solid-strand product of floor covering manufacturer for heat-welding seams.
 - 1. Color: As selected by Architect from manufacturer's full range of colors to contrast with field color of sheet vinyl floor covering.
- D. Chemical Bonding Compound: Product of floor covering manufacturer for chemically bonding seams.
- E. Cove Strip: 1-inch- (25.4-mm-) radius support for integral flash cove base provided or approved by floor covering manufacturer.
- F. Cove-Base Cap Strip: Square metal, vinyl, or rubber cap for integral flash cove base provided or approved by floor covering manufacturer.
- G. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of sheet vinyl floor coverings, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of sheet vinyl floor coverings will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for floor covering installation and comply with requirements specified.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by floor covering manufacturer.
 - 2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with sheet vinyl floor covering manufacturer's written installation instructions for preparing substrates indicated to receive sheet vinyl floor coverings.

- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Broom and vacuum clean substrates to be covered immediately before installing sheet vinyl floor coverings. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. General: Comply with sheet vinyl floor covering manufacturer's written installation instructions.
- B. Unroll sheet vinyl floor coverings and allow them to stabilize before cutting and fitting, if recommended in writing by manufacturer.
- C. Lay out sheet vinyl floor coverings to comply with the following requirements:
 - 1. Maintain uniformity of sheet vinyl floor covering direction.
 - 2. Arrange for a minimum number of seams and place them in inconspicuous and low-traffic areas, and not less than 6 inches (150 mm) away from parallel joints in flooring substrates.
 - 3. Match edges of sheet vinyl floor coverings for color shading and pattern at seams according to manufacturer's written recommendations.
 - 4. Avoid cross seams.
- D. Scribe, cut, and fit sheet vinyl floor coverings to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- E. Integral Flash Cove Base: Where indicated, cut sheet vinyl floor coverings to form integral base of height indicated at vertical surfaces.
- F. Extend sheet vinyl floor coverings into toe spaces, door reveals, closets, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.
- H. Install sheet vinyl floor coverings on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.
- I. Adhere sheet vinyl floor coverings to flooring substrates to comply with floor covering manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

1. Produce completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
 2. Form integral flash cove base by flashing floor covering up vertical surfaces. Support floor covering at horizontal and vertical junction with cove strip. Butt floor covering at top of base against cap strip.
- J. Heat-Welded Seams: Rout joints and heat weld with welding bead, permanently fusing sections into a seamless floor covering. Prepare, weld, and finish seams according to manufacturer's written instructions and ASTM F 1516 to produce surfaces flush with adjoining floor covering surfaces.
- K. Chemically Bonded Seams: Chemically bond seams with bonding compound, permanently fusing sections into a seamless floor covering. Prepare seams and apply compound according to manufacturer's written instructions and ASTM F 693 to produce tightly fitted seams without gaps, overlays, or excess bonding compound on floor covering surfaces.
- L. Hand roll sheet vinyl floor coverings in both directions from center out to embed floor coverings in adhesive and eliminate trapped air. At walls, door casings, and other locations where access by roller is impractical, press floor coverings firmly in place with flat-bladed instrument.

3.4 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing sheet vinyl floor coverings:
1. Remove adhesive and other surface blemishes using cleaner recommended by floor covering manufacturer.
 2. Sweep or vacuum floor thoroughly.
 3. Do not wash floor covering until after time period recommended by floor covering manufacturer.
 4. Damp-mop floor to remove marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by floor covering manufacturer.
1. Apply protective floor polish to sheet vinyl floor covering surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.
 - a. Use commercially available product acceptable to floor covering manufacturer.
 - b. Coordinate selection of floor polish with Owner's maintenance service.
 2. Cover sheet vinyl floor coverings with undyed, untreated building paper until inspection for Substantial Completion.
 3. Do not move heavy and sharp objects directly over sheet vinyl floor coverings. Place plywood or hardboard panels over floor coverings and under objects while they are being moved. Slide or roll objects over panels without moving panels.

- C. Clean sheet vinyl floor coverings not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean floor coverings according to manufacturer's written recommendations.

END OF SECTION 09516

SECTION 096519 - RESILIENT TILE FLOORING

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. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of floor tile indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **50 deg F (10 deg C)** or more than **90 deg F (32 deg C)**. Store floor tiles on flat surfaces.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than **70 deg F (21 deg C)** or more than **95 deg F (35 deg C)**, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

1.8 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 SOLID VINYL FLOOR TILE

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Armstrong "Standard Excelon"
 - 2. approved equal.
- B. Tile Standard: ASTM F 1700.
 - 1. Class: As indicated by product designations.

- 2. Type: Durable, semi-flexible compressed quartz vinyl tile
- C. Thickness: 0.100 inch (2.5 mm).
- D. Size: 24 by 24 inches (610 by 610 mm).
- E. Seaming Method: Standard.
- F. Colors and Patterns: As selected by Architect from full range of industry colors.
- G. Co-efficient of friction for all resilient floor tile shall be at least 0.5 per ASTM D2047

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
 - 1. Ecofix 25 or approved alternative acrylic adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 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. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 85% relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate. See section 033000, Cast-in-place concrete, for additional information.
- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles with grain running in one direction.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

- G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: By owner (NIC).
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes modular, carpet tile.
- B. Related Requirements:
 - 1. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include installation recommendations for each type of substrate.
- B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet Tile: Full-size units equal to Five (5) percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Carpet manufacturer shall have no less than 5 years experience of producing recyclable carpet tile and shall have published product literature clearly indicating compliance with requirements of this section.
- B. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- C. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.
- D. DELI Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Build mockups at locations and in sizes shown on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 VERY, STORAGE, AND HANDLING

- A. Comply with CRI 104 for delivery, storage and handling.

1.10 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent face fiber loss, edge raveling, dimensional instability, excess static discharge, loss of tuft bind strength, delamination, and where face fiber is 100 percent solution dyed, inability to remove acid based stains, lack of colorfastness to atmospheric contaminants.
 - 3. Carpet must be manufactured and warranted by same manufacturer.
 - 4. Warranty Period: Lifetime Commercial Limited Warranty.

PART 2 - PRODUCTS

2.1 CARPET TILE, TYPE CT-1

- A. Basis-of-Design Product: Subject to compliance with requirements as selected for this project by the Owner and Architect, provide Patcraft Experience Modular I0291; or approved equal.comparable product by one of the following:
 - 1. Patcraft
 - 2. Mannington
 - 3. Approved Equal
- B. Source Limitations:
 - 1. Single Source Responsibility: Provide products that have components manufactured by a single source. Fiber and backing, as well as final carpet product, should be manufactured and warranted by same company.
 - 2. Commitment to sustainability: Carpet manufacturer must practice environmental responsibility through programs of source reduction, recycling, reuse, and conservation.
- C. Color: Perception 00750 or as selected by Architect from manufacturer's full range.
- D. Pile Characteristics: Multi Level Pattern Loop
- E. Fiber Content Nylon - 100 percent trilobal, minimum 24 denier per filament DPF nylon 6. Fiber must contain a minimum of 45 percent recycled content 20 percent pre consumer recycled content and 25 percent post consumer recycled content.
- F. Fiber Name: Eco Solution Q Nylon
- G. Dye Method: 100 percent Solution Dye
- H. Gauge: 1/12

- I. Stitches: 9.5
- J. Pile Thickness: 0.095
- K. Surface Pile Weight: 17 oz
- L. Density: 6442
- M. Primary Backing: Nonwoven synthetic.
- N. Secondary Backing: High performance precoat laminated to a proprietary thermoplastic polyolefin compound with a fiberglass reinforced layer. Backing must contain a minimum of 40 percent recycled content and be SCS NSF 140 Platinum certified. Backing should be recyclable, PVC free, free of 4-PCH, brominated flame retardants, and phthalate plasticizers.
 - 1. Total Backing Weight: Not to exceed 80 oz./sq yd (339.1 g/sq m).
- O. Backing System: EcoWorx.
- P. Applied Soil-Resistance Treatment: SSP Shaw Soil Protection.
- Q. Total Weight: 89 oz for finished carpet tile.
- R. Size: 24 by 24 inches
- S. Texture Appearance Retention Rating (T.A.R.R.):
 - 1. Texture Appearance Retention Rating (T.A.R.R.): Heavy
- T. Recycling Requirements:
 - 1. Total Carpet Product Recycled Content:
 - a. Pre-Consumer Recycled Content: 33.2 percent.
 - b. Post-Consumer Recycled Content: 11.2 percent.
 - c. Total Recycled Content: 44.4 percent.
 - 2. Recycled Content: Preference will be given to manufacturer's recycling 100 percent of reclaimed carpet tile back into carpet tile with recycled content.
 - 3. Carpet Disassembly and Recycling: Carpet capable of disassembly and recycling, with nylon being recycled into nylon and backing being recycled into backing.
 - 4. Carpet product must meet guidelines of Presidential Executive Order 13101, and must meet the spirit of section 6002 of the Resource and Recovery Act (RCRA).
- U. Performance Characteristics: As follows:
 - 1. Critical Radiant Flux Classification, Flooring Radiant Panel ASTM E 648: Not less than 0.45 W/sq. cm.
 - 2. Smoke Density: Less than 450 per ASTM E662.
 - 3. Methanamine Pill Test CPSC FF1-70: Must pass pill test.
 - 4. Tuft Bind: Not less than 8 lbf (36 N) according to ASTM D 1335.
 - 5. Delamination: Not less than 3.5 lbf/in. according to ASTM D 3936.

6. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.119 percent or less according to ISO 2551 (Aachen Test).
8. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 129 and AATCC 164.
9. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
10. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.
11. Emissions: Provide carpet tile that complies with testing and product requirements of Carpet & Rug Institute's "Green Label Plus" program.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Trowelable Adhesives: Water-resistant, mildew-resistant, nonstaining, premium grade, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation such as Shaw 5000 or Shaw 5100 or available equivalent where slab moisture does not exceed 85 percent per ASTM F 2170 or 5 lbs per ASTM F 1869. Where slab moisture does not exceed 85 percent and antimicrobial protection is needed to pass AATCC 174, use Shaw 5036. Where moisture exceeds 85 percent or 5 lbs but does not exceed 90 percent or 10 lbs, use Shaw 5900 or available equivalent.
 1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesives 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."
 3. Adhesives shall comply with the testing and product requirements of the Carpet and Rug Institute Green Label Plus Program.
- C. Non-Trowelable Adhesive: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation such as LokDots where slab moisture does not exceed 95 percent per ASTM F 2170 or 10 lbs per ASTM F 1869. Each carpet tile must be adhered to the subfloor.
- D. Metal Edge/Transition Strips: Extruded aluminum with mill finish (unless otherwise noted) of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting

carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects prior to installation. See manufacturer's requirements for substrate conditions and ambient conditions.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing moisture and pH tests as recommended by carpet tile manufacturer.
2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
4. Lightweight concrete and gypcrete subfloors may require a primer such as Shaw 9050 or equivalent to reduce surface porosity.
5. Where previous surface treatments are unknown, or where other concerns exist as to the ability of the adhesive to bond to the substrate, a 24 hour bond test is recommended.

C. For wood subfloors, verify the following:

1. Underlayment over subfloor complies with requirements specified in Section 061000 "Rough Carpentry."
2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
3. Unfinished wood should be primed using a liquid latex primer, such as Shaw 9050 or equivalent.

D. For metal subfloors, verify the following:

1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

E. For painted subfloors, verify the following:

1. Perform bond test recommended in writing by adhesive manufacturer.

F. For raised access flooring systems, verify the following:

1. Access floor substrate is compatible with carpet tile and adhesive if any.
2. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than 1/8 inch, protrusions more than 1/32 inch and substances that may interfere with adhesive bond or show through surface.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with Carpet & Rug Institute Installation Standard 2011, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds that contain a cementitious base with a latex additive, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and

protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with Carpet & Rug Institute installation Standard 2011, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive, such as LokDots. Any non-spreadable adhesive system must adhere the carpet to the substrate.
- C. Maintain dye lot integrity. Do not mix dye lots in same area unless the specific carpet style is manufactured as a merge-able dye lot product.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.
- H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.
- I. Roll the entire installation with a 75 lb roller once installation is completed.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 1. Remove excess adhesive, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 2. Remove yarns that protrude from carpet tile surface.
 3. Vacuum carpet tile using commercial machine with face-beater element.

- B. Protect installed carpet tile to comply with Carpet & Rug Institute Installation Standard 2011, "Protecting Indoor Installations."
- C. When construction or move-in activities will continue where new carpet is installed, provide non-staining building material paper to protect carpet. Do not use plastic sheeting as it can trap moisture, and self-sticking plastic sheeting can transfer adhesive residue to carpet that will attract soil.
- D. When heavy objects are moved over carpet within 24 hours of installation, use plywood over carpet to prevent buckling and wrinkling.
- E. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099113 - EXTERIOR PAINTING

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 surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Concrete.
 - 2. Fiber-cement board.
 - 3. Concrete masonry units (CMUs).
 - 4. Steel and iron.
 - 5. Galvanized metal.
 - 6. Aluminum (not anodized or otherwise coated).
 - 7. Wood.
 - 8. Portland cement plaster (stucco).

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product VOC content Samples for Initial Selection: For each type of topcoat product indicated.

- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Label each Sample for location and application area.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: **5** percent, but not less than **1 gal. (3.8 L)** of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.
 - b. Architect reserves the right to make minor adjustments to color, value and hue without cost change.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Kelly-Moore Paints.
 - 2. Approved equal.

2.2 PAINT, 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.
- B. Colors: As selected by Architect from manufacturer's full range.

2.3 EXTERIOR PAINT SCHEDULE (#'s shown are Kelly-Moore)

- A. Stucco:
 - 1. Primer: 1 coat #295 Kel-Bond
 - 2. Finish: 2 coats #1245 Acry-Shield acrylic low sheen
- B. Aluminum, Ferrous Metal
 - 1. Primer: 1 coat #295 Kel-Bond
 - 2. Finish: 2 coats #1250 Acry-Shield semi-gloss
- C. Hollow Metal
 - 1. Primer: 1 coat #295 Kel-Bond
 - 2. Finish: 2 coats #1250 Acry-Shield semi-gloss
- D. Wood
 - 1. Primer: 1 coat #255 Acry-Shield acrylic primer
 - 2. Finish: 2 coats #1245 Acry-Shield acrylic low sheen

- E. Galvanized Metal
 - 1. Primer: 1 coat # 295 Kel-Bond
 - 2. Finish: 2 coats #1250 Acry-Shield semi-gloss
- F. Steel & Galvanized Metal (New, Unfinished)
 - 1. Etcher / Cleaner: 1 coat Rustolem #3599
 - 2. Primer: 1 coat # 5725 DTM
 - 3. Finish: 2 coats #1250 Acry-Shield semi-gloss

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Wood: 15 percent.
 - 3. Plaster: 12 percent.
 - 4. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- F. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance of paint materials with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

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 surface preparation and the application of paint systems on:
 - 1. Wood.
 - 2. Gypsum board.
- B. Related Requirements:
 - 1. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Kelly-Moore Paints.
 2. Approved equal.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. 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.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.
- D. Low-Emitting Materials: Interior paints and coatings 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. Colors: Match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent.
 - 2. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Wood Substrates: Including wood trim.
 - 1. Primer: 1 coat #985 enamel undercoat
 - 2. Finish: 2 coats #1640 acrylic satin enamel
- B. Gypsum Board and Plaster Substrates: Satin, typical unless otherwise noted
 - 1. Primer: 1 coat #971 PVA primer / sealer
 - 2. Finish: 2 coats #1640 acrylic satin enamel
- C. Damaged Framing: including wall, roof & ceiling framing
 - 1. Primer/Sealer: 2 coats KILZ Max Primer, primer / sealer.

END OF SECTION 099123

SECTION 101423 - PANEL SIGNAGE

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. Panel signs.
 - 2. Illuminated panel signs.
 - 3. Field-applied, vinyl-character signs.

- B. Signage types:

- 1. Site signage including:
 - a. Parking
 - b. Pedestrian directional and information
 - 2. Building signage including:
 - a. Building identification
 - b. Room identification
 - c. Tactile exit signs
 - d. Toilet room identification
 - e. International Symbol of Accessibility
 - f. No Smoking Signs

- C. Related Sections include the following:

- 1. Division 22 Section "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
 - 2. Division 23 Section "Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
 - 3. Division 26 Sections for electrical service and connections for illuminated signs.
 - 4. Division 26 Section "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.
 - 5. Division 26 Section "Interior Lighting" for illuminated Exit signs.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
 - 1. Aluminum
 - 2. Acrylic sheet.
 - 3. Die-cut vinyl characters and graphic symbols. Include representative samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Plaque Casting: 6 inches (150 mm) square.
 - 2. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element)
 - 3. Panel Signs: Not less than one complete sign.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. 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.
- C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- D. Regulatory Requirements for panel and directional signage: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and 2013 California Building Code including Section 1117B.5.1 – 1117B.5.10 including the following:
 - 1. Characters and Pictorial Symbol Signs: Letters and numerals shall be raised 1/32 in., upper case, sans serif or simple serif type and shall be accompanied with contracted Grade 2 Braille. Raised characters or symbols shall be at least 5/8 in. high, but no higher than 2 in. Pictograms shall be accompanied by the equivalent verbal description placed directly below the pictogram. The border dimension of the pictogram shall be 6 inch minimum height.
 - 2. Contracted Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Dots shall be 1/10 inch (2.54 mm) on centers in each cell with 2/10-inch (5.08 mm) space between cells, measured from the second column of dots in the first cell

to the first column of dots in the second cell. Dots shall be raised a minimum of 1/40 inch (0.635 mm) above the background.

3. Finish and Contrast: the characters and background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast with their background.
4. Symbol color: the International Symbol of Accessibility used on sign shall consist of a white figure on a blue background. The blue shall be equal to color no. 15090 in Federal Standard 595b.
5. Tactile Exit Signs: Comply with 2013 CBC Section 1011.3 for locations and specific text.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Deterioration of embedded graphic image colors and sign lamination.
 - b. Deterioration of metal and polymer finishes beyond normal weathering
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- B. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 PANEL SIGNS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. ASI-Modulex, Inc.
 2. ASAP Signs and Graphics

- a. 590 Brunken Ave., Suite B, Salinas, CA 93901
 - b. Ph: 831-757-7377
- 3. Approved equal.
- B. Building Signage, Exterior and Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:
 - 1. Acrylic Sheet: 0.080 inch (2.03 mm).
 - 2. Edge Condition: Square cut.
 - 3. Corner Condition: Square.
 - 4. Mounting: Unframed.
 - a. Wall mounted with mechanical fasteners and two-faced tape.
 - 5. Color: As selected by Architect from manufacturer's full range.
- C. Site Signage: See Drawings
- D. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with 2013 CBC. Text shall be accompanied by Contracted Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
 - 1. Panel Material: Clear acrylic sheet with opaque color coating, subsurface applied.
 - 2. Raised-Copy Thickness: Not less than 1/32 inch (0.8 mm).
- E. Subsurface Copy: Apply minimum 4-mil- (0.10-mm-) thick vinyl copy to back face of clear acrylic sheet forming panel face to produce precisely formed opaque image. Image shall be free of rough edges.

2.3 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.4 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.

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 ACRYLIC SHEET FINISHES

- A. **Colored Coatings for Acrylic Sheet:** For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

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 work.
- B. Verify that items are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. **Interior Wall Signs:** Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door.
- B. **Wall-Mounted Signs:** Install with tape AND mechanical fasteners. Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. **Two-Face Tape:** Mount signs to smooth, nonporous surfaces (Glass). Do not use this method for vinyl-covered or rough surfaces.
 - 2. **Mechanical Fasteners:** Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 - 3. **Signs Mounted on Glass:** Provide matching opaque plate on opposite side of glass to conceal mounting materials.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101423

SECTION 102800 - 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.

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 indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.

1.5 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.8 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.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. [Bobrick Washroom Equipment, Inc.](#)
 2. Approved equal.

B. Soap Dispenser:

1. Counter Mounted: B-8221.
2. Wall Mounted: B-2112
3. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Paper Towel Dispenser:

1. Wall Mounted, B-369.
2. Wall Mounted, B-2621 (at Kitchen)
3. Material and Finish: Stainless steel, No. 4 finish (satin).

D. Seat Cover Dispenser:

1. Wall Mounted, B-221.
1. Material and Finish: Stainless steel, No. 4 finish (satin).

E. Mirror:

1. Wall Mounted, B-290.
2. Material and Finish: Stainless steel, No. 4 finish (satin).

F. Toilet Tissue Dispenser:

1. Wall Mounted, B-6637.
2. Material and Finish: Stainless steel, No. 4 finish (satin).

G. Grab Bars:

1. Wall Mounted, B-6806.
2. Material and Finish: Stainless steel, No. 4 finish (satin).

H. Partition-Mounted Toilet Seat-Cover and Toilet Tissue Dispenser

1. Partition Mounted, B34715
2. Material and Finish: Stainless steel, No. 4 finish (satin).

I. Clothes Hook Strip

1. Wall Mounted, B985
2. Material and Finish: Stainless steel, No. 4 finish (satin).

J. Mop/Broom Holder with Shelp

1. Wall Mounted, B-239
2. Material and Finish: Stainless steel, No. 4 finish (satin).

2.3 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, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-protection cabinets for the following:
 - a. Portable fire extinguishers.
 - b. Fire hose valves.
 - c. Fire hoses and racks.
- B. Related Requirements:
 - 1. Section 104416 "Fire Extinguishers."
 - 2. Section 210000 "Fire Protection, General".

1.3 PREINSTALLATION CONFERENCE

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to fire-protection cabinets including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed, semi-recessed, or surface-mounting method and relationships of box and trim to surrounding construction.
 - 1. Show location of knockouts for hose valves.
- B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.
- D. Samples for Initial Selection: For each type of exposed finish required.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples 6 by 6 inches (150 by 150 mm) square.

- F. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semi-recessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers, fire hoses, hose valves, and hose racks indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for typical fire extinguisher.
 - 1. Manufacturer:
 - a. J.L. Industries, Inc.; a division of Activar construction Products Group; "Ambassador Series", style 1816F10.
 - b. Approved Equal.
- B. Cabinet Type: Suitable for Type 'K' fire extinguisher (at kitchen areas).
 - 1. Manufacturer:
 - a. J.L. Industries, Inc.; a division of Activar construction Products Group; "Ambassador Series", style 2017F10.
 - b. Approved Equal.
- C. Cabinet Construction: Non-rated, typical; fire rated at rated construction. See Drawings.
 - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- (1.09-mm-) thick cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material. Provide factory-drilled mounting holes.
- D. Cabinet Material: Cold-rolled steel sheet.
 - 1. Shelf: Same metal and finish as cabinet.

- E. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - 1. Square-Edge Trim: 1-1/2-inch (38-mm) backbend depth at typical fire extinguisher.
 - 2. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth at Type 'K' fire extinguisher.
- F. Cabinet Trim Material: Steel sheet.
- G. Door Material: Steel sheet.
- H. Door Style: Fully glazed panel with frame.
- I. Door Glazing: Acrylic sheet.
 - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide manufacturer's standard.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- K. 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. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
- L. Materials:
 - 1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
 - a. Finish: Baked enamel or powder coat.
 - b. Color: White, typical. Black, where located on surfaces painted black. .
 - 2. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 3 mm thick.

2.3 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire hose, rack, and valve. See Fire Protection Drawings.

2.4 FABRICATION

- A. Fire-Protection 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.
 3. Prepare doors and frames to receive locks.
 4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
 2. Fabricate door frames of one-piece construction with edges flanged.
 3. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for hose valves, racks and cabinets to verify actual locations of piping connections before cabinet installation.
- B. Examine walls and partitions for suitable framing depth and blocking where recessed & semirecessed cabinets will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed and semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
2. Provide inside latch and lock for break-glass panels.
3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
4. Fire-Rated Cabinets:
 - a. Install cabinet with not more than 1/16-inch (1.6-mm) tolerance between pipe OD and knockout OD. Center pipe within knockout.
 - b. Seal through penetrations with firestopping sealant as specified in Section 078413 "Penetration Firestopping."

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-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers.
- B. Related Requirements:
 - 1. Section 104413 "Fire Protection Cabinets."

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.

1.5 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.7 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.8 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 PERFORMANCE REQUIREMENTS

- 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. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.
- B. Typical, Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, **5-lb (2.3-kg)** nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
 - 1. Manufacturer:
 - a. J.L. Industries, Inc.; a division of Activar construction Products Group; "Cosmic 5E".
 - b. Approved Equal.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
- C. Class K Wet-Chemical Type: UL-rated 2-A:1-B:C:K, **2.5-gal. (9.5-L)** nominal capacity, with potassium acetate-based chemical in stainless-steel container; with pressure-indicating gage.
 - 1. Manufacturer:
 - a. J.L. Industries, Inc.; a division of Activar construction Products Group; "Saturn 25".
 - b. Approved Equal.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.

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 in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104416

SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes plastic-laminate countertops.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. 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.
 - 2. Apply WI Certified Compliance Program label to Shop Drawings.
- C. Samples for Initial Selection & Verification:
 - 1. Plastic laminates, for each type, color, pattern, and surface finish.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Fabricator & Installer.
- B. Woodwork Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.5 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: Licensee of WI's Certified Compliance Program.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver countertops until painting and similar operations that could damage countertops have been completed in installation areas. If countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install 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 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.
- C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.
 - 1. Provide labels and certificates from WI certification program indicating that countertops, including installation, comply with requirements of grades specified.
 - 2. 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. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGP.
 - 1. Wilsonart International
 - 2. Formica Corporation
 - 3. Approved Equal.
- D. Chemical-Resistant, High-Pressure Decorative Laminate: NEMA LD 3, Grade HGP, and as follows:
 - 1. Laminate has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.9.5:

- a. Nitric Acid (30 Percent): Moderate effect.
 - b. Sulfuric Acid (77 Percent): Moderate effect.
 - c. Hydrochloric Acid (37 Percent): Moderate effect.
 - d. Phosphoric Acid (75 Percent): No effect.
 - e. Acetic Acid (98 Percent): No effect.
 - f. Formaldehyde: No effect.
 - g. Ethyl Acetate: No effect.
 - h. Ethyl Ether: No effect.
 - i. Phenol (85 Percent): Moderate effect.
 - j. Benzene: No effect.
 - k. Xylene: No effect.
 - l. Butyl Alcohol: No effect.
 - m. Furfural: No effect.
 - n. Methyl Ethyl Ketone: No effect.
 - o. Sodium Hydroxide (25 Percent): No effect.
 - p. Sodium Sulfide (15 Percent): No effect.
 - q. Ammonium Hydroxide (28 Percent): No effect.
 - r. Zinc Chloride: No effect.
 - s. Gentian Violet: No effect.
 - t. Methyl Red: No effect.
2. 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. Formica Corporation.
 - b. Wilsonart.
 - c. Approved Equal.
- E. 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 manufacturer's full range in the following categories:
 - a. Solid colors, matte finish.
 - b. Solid colors with core same color as surface, matte finish.
 - c. Patterns, matte finish.
 - 2. Grain Direction: Verify with Architect
- F. Edge Treatment: Round, waterfall edge.
- G. Backsplash: Coved splash joint, waterfall top.
- H. Core Material: Exterior-grade plywood.
- I. Core Material at Sinks: Exterior-grade plywood.
- J. Core Thickness: 3/4 inch (19 mm).
- 1. Build up countertop thickness to 1-1/2 inches (38 mm) at front, back, and ends with additional layers of core material laminated to top.

- K. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.
- L. Paper Backing: Provide paper backing on underside of countertop substrate.

2.2 ACCESSORIES

- A. Grommets for Cable Passage through Countertops: 2-inch (51-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Manufacturer:
 - a. Doug Mockett & Company, Inc.
 - b. Approved Equal.
 - 2. Color: From manufacturer's full color palate.

2.3 MISCELLANEOUS MATERIALS

- A. Adhesives: Do not use adhesives that contain urea formaldehyde.
- B. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.4 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch (25 mm) over base cabinets. Ease edges to radius indicated for the following:
 - 1. Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.
- C. Complete fabrication, including assembly, 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.
- D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, 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.

1. Seal edges of openings in countertops with a coat of varnish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble 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.
- 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 (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Install 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 (3 mm in 2400 mm).
- E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. 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 (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) 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.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 123623.13

**SECTION 200050
MECHANICAL GENERAL**

PART I - GENERAL

1.1 GENERAL

- A. The General Conditions and Supplementary General Conditions are hereby a part of this Section as fully as if repeated herein.

1.2 SCOPE

- A. The work includes, but is not necessarily limited to, the furnishing of all labor, materials, equipment, and services necessary for, and reasonably incidental to, providing and installing complete heating, ventilating, and air conditioning systems, exhaust systems, piping systems, plumbing systems, fire protection systems, and other mechanical work as shown or indicated in the Drawings and Specifications.
- B. Consult all other Sections to determine the extent and character of this work specified elsewhere.
- C. Specifically refer to the following:
- | | |
|-----------------------|------------------------|
| Section 210500 | <u>Fire Protection</u> |
| Section 220400 | <u>Plumbing</u> |
| Section 230800 | <u>HVAC</u> |
- D. Make all connections to equipment requiring service from systems installed under this Section.

1.3 COORDINATION

- A. Before submitting a bid for the mechanical work the Contractor shall visit the site and become familiar with all the work on other related Drawings and Specifications, and plan the work to provide the best possible assembly of the combined work of all trades. No additional costs will be considered for work which has to be relocated due to conflicts with other trades.
- B. If, after examination of the bidding documents relating to the work, the Contractor has queries concerning the nature and scope of the work or intent of the Specifications, he/she shall promptly request clarification from the **Architect**. After contract award, claims of ignorance of the intent and scope of the contract shall not be allowed.
- C. Contractor is responsible for coordinating the schedule of inspections by **Engineer** at appropriate stages of construction such as rough-in, pre-final, and final, and at other times required by the Specifications or by the construction. Notify **Architect** and **Engineer** seven (7) days in advance of proposed site visit.

Notification constitutes certification that construction is, or will be, complete and ready for inspection.

1.4 SAFETY

- A. Contractors must conduct a weekly safety meeting with their employees and provide documentation as to attendance and topics of discussion. **Engineer's** construction support services do not constitute review or approval of Contractor's safety procedures. Contractor shall comply with all OSHA regulations. Contractor is required to obtain and pay for insurance required to cover all activities within Contractor's Scope of Work.

1.5 BUILDING LAWS

- A. Mechanical work shall conform to all requirements prescribed by governmental bodies having jurisdiction and is to be in accordance with the Uniform Building Code; all federal, state, and local codes and ordinances; all OSHA requirements; **California** Plumbing Code, **California** Mechanical Code, **California** Fire Code, and National Fire Protection Association; California State Code Title 8, Title 21, Title 24; and the Energy Conservation Standards.
- B. Should any part of the design fail to comply with such requirements, the discrepancy shall be called to the attention of the **Architect** prior to submitting bid.
- C. Should there be any direct conflict between the Drawings and/or Specifications and the above rules and regulations, the rules and regulations shall take precedence. However, when the indicated material, workmanship, arrangement, or construction is of a superior quality or capacity to that required by above rules and regulations, the Drawings and/or Specifications shall take precedence. Rulings and interpretations of enforcing agencies shall be considered as part of the regulations.
- D. After a Contract is awarded, if minor changes or additions are required by the aforementioned authorities, even though such work is not shown on Drawings or overtly covered in the Specifications, they must be included at the Contractor's expense.
- E. The Contractor is responsible to coordinate and make adjustments in his/her work with the full set of Contract Drawings and Specifications.
- F. All piping, ducts, and equipment shall be securely anchored to building structure as required herein and by the Uniform Building Code.

1.6 PERMITS, FEES, AND UTILITIES

See Division 1.

1.7 UTILITY CONNECTIONS

- A. See Section **220400** for site utility connection requirements.

1.8 TEMPORARY CONSTRUCTION WATER

- A. The Plumbing Contractor shall make all arrangements and provide necessary facilities for the temporary construction water from the **Owner's** source. Costs for the temporary construction water shall be paid for by **Owner**.

1.9 PAINTING

- A. See Division 099113 and 099123 for painting of piping, equipment, etc.

PART II - PRODUCTS

2.1 MATERIALS

- A. All materials used shall be new as listed in subheadings and indicated on Drawings. Inspect all materials and immediately remove defective materials from the site.
- B. All electrical materials shall bear the label of, or be listed by, the Underwriters' Laboratories (UL), unless the material is of a type for which label or listing service is not provided.
- C. Substitution:
 - 1. No substitute materials or equipment may be installed without the written approval of the **Architect**.
 - 2. Use of substitute materials or equipment may require changes in associated materials and equipment. Contractor shall submit detailed Shop Drawings and installation instructions of substitute materials and equipment to **Architect** for approval. Such submittals shall address all changes required in other items.
 - 3. All additional costs incurred by the substitution of material or equipment, or the installation thereof whether Architectural, Structural, Mechanical, Plumbing, or Electrical shall be borne by the Contractor who substitutes the materials or equipment in place of the items specified.
- D. Quality of Materials: Pipe fittings and equipment may be taken from stock but the Contractor will be required to submit manufacturer's certificates identifying the material and equipment furnished as conforming with these Specifications and such codes and standards as apply to the equipment specified. Any material on the site which cannot be identified by manufacturer's mark shall be removed from the site at **Architect's** request.

2.2 SUBMITTALS

- A. The review of submittals and approval thereof by the **Architect** does not relieve the Contractor from compliance with the requirements and intentions of the Drawings and Specifications to which the submittals pertain. The contractor acknowledges its responsibility to submit complete shop drawings and other

required submittals. Incomplete submittals will be returned to the contractor unreviewed.

- B. Material List: An itemized list of material and equipment which the Contractor proposes to use shall be submitted to the **Architect** with number of copies indicated and within time indicated.
- C. Shop Drawings and Product Data:
 - 1. Submit all required Shop Drawings, product data, etc. at one time. Submittals shall be bound, tabbed, and properly indexed by Specification Section.
 - 2. Each item shall be identified by manufacturer, brand, and trade name; model number, size, rating, and whatever other data is necessary to properly identify and verify the materials and equipment. The words "AS SPECIFIED" will not be considered sufficient information.
 - 3. Each submittal shall bear the Contractor's stamp and mark indicating the Contractor has reviewed and approved the submittal.
 - 4. Each submitted item shall refer to the Specification Section and paragraph in which the item is specified.
 - 5. Accessories, controls, finish, etc. not required to be submitted or identified with the submitted equipment shall be furnished and installed as specified.
 - 6. Submittals shall be all inclusive with all items requiring submittals being submitted at the same time; individual submittals will not be accepted.
 - 7. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet construction schedule, together with any special handling charges, shall be borne by Contractor.

PART III - EXECUTION

3.1 DRAWINGS

- A. The Drawings show the general arrangement and location of the piping and equipment. Work shall be installed in accordance with the Drawings, except for changes required by conflicts with the work of other trades. The Contractor shall provide for the support, expansion, and pitch of any rearranged piping in conformance with the intent of the Drawings, Specifications, and codes.
- B. Note that certain mechanical work is shown, wholly or in part, on Architectural Drawings.

- C. Mechanical Drawings are diagrammatic and are intended to show the approximate location of equipment and piping. Dimensions shown on Drawings shall take precedence over scaled dimensions on Drawings. All dimensions shall be verified in the field by the Contractor.
- D. The exact location of apparatus, equipment, and piping shall be ascertained from the **Architect** or the **Architect's** representative in the field, and work shall be laid out accordingly. Should the Contractor fail to ascertain such locations the work shall be changed at Contractor's own expense when so ordered by the **Architect**. The **Architect** reserves the right to make minor changes in the location of piping and equipment up to the time of installation without additional cost.
- E. It is the intention of the Drawings and Specifications that, where certain mechanical items such as unions, expansion joints, and other mechanical components are not shown, but where such items are required by the nature of the work, shall be furnished and installed.
- F. The Mechanical Drawings and Specifications are intended to supplement each other. Any material or labor called for in one shall be furnished even though not specifically mentioned in the other.
- G. Pipe and duct sizes shown are the minimum allowable and shall be increased in size if required by code or wherever necessary to meet unusual conditions.

3.2 RECORD DRAWINGS

- A. Record Drawings shall be maintained at all times showing the exact location of equipment, ductwork, control panels, piping mains, branches, valves, drains, clean-outs, etc. installed under all Sections. Obtain from the **Architect**, at cost, a complete set of prints. On these prints systematically and accurately keep a dimensional record of all work installed different from those shown on Drawings. Have these Drawings readily available for reference.
- B. Record Set: When above information is complete and acceptable to the **Architect** transfer this information accurately to reproducible tracings, purchased at cost from the **Architect** for this purpose, and deliver to the **Architect** for final review.
- C. Upon completion of the **Architect's** review of the Record Set the Contractor shall incorporate changes, as noted on the record set, including dimensions such as building waste inverts, valves, etc. Deliver transparencies with one (1) set of prints to the **Architect**. Deliver one (1) complete set of prints to building Owner within ninety (90) days of issuance of final occupancy report.
- D. Inspector's Approval: Where a full-time inspector is employed by the **Owner**, the Record Drawing information shall be reviewed by the inspector during the course of construction and shall have the inspector's approval before submission to the **Architect**.

3.3 MECHANICAL ACCEPTANCE TESTS

- A. Documentation on standard State of California Acceptance forms and inspection documents as listed on the project Certificate of Compliance shall be submitted to building department prior to issuance of building permit.
- B. The required acceptance documents generated by the responsible person shall be signed by a designated licensed professional before submitting the required documents for final occupancy permit.

3.4 DAMAGE

- A. Repair any damage to the building, premises, and equipment occasioned by the work under this Section.
- B. Repair all damage to any part of the building or premises caused by leaks or breaks in pipe, or malfunctions of equipment furnished or installed under this Section until the warranty period expiration date.

3.5 COMPLETE WORKING INSTALLATION

- A. The Drawings and Specifications do not attempt to list every item that must be installed. When an item is necessary for the satisfactory operation of equipment, is required by the equipment manufacturer, or accepted as good practice, furnish without change in Contract cost.

3.6 STORAGE

- A. Provide proper protection and storage of all items and tools required for this work.

3.7 QUALITY OF WORK

- A. The quality of work shall be of a standard generally accepted in the respective trade. Use only experienced, competent, and properly equipped workers. Replace work falling below this standard as directed by the **Architect**.
- B. Systems shall be worked into a complete and integrated arrangement with like elements arranged to make a neat appearing and finished piece of work, with adequate head room and passageway free from obstructions. Such systems shall be installed by laborers experienced in the respective trades involved.

3.8 CONCRETE WALLS AND CONCRETE FOOTINGS

- A. Where pipes must pass through concrete walls and footings, they shall pass through SDR 35 PVC pipe sleeves with 1/2" annular space set in place at time of construction.
- B. Ducts shall pass through 10 gauge galvanized sheetmetal sleeves. Provide sheetmetal closure collars at duct penetration.

- C. Sheetmetal sleeves set into concrete walls: Provide steel frame around opening where required by Structural Engineer.
- D. Coordinate core drilled openings with **Architect** and General Contractor. Coordination shall include location, size, and spacing of openings. No slot openings will be allowed. Coordinate openings to avoid critical structural items such as reinforcing bars, tensioning tendons, etc.
- E. Also see Paragraph 3.13.

3.9 **ELECTRICAL REQUIREMENTS - CONTROLS AND COORDINATION WITH ELECTRICAL CONTRACTOR**

- A. Mechanical Contractor shall coordinate with the Electrical Contractor on furnishing and installing of controls, motors, starters, etc. Coordinate means informing Electrical Contractor of items requiring electrical connection, providing copies of submittal data, installation data, scheduling work to insure efficient progress, and promptly supplying those items to be installed by Electrical Contractor.
- B. The specific requirements for electrical power and/or devices for each and every piece of mechanical and plumbing equipment requiring electrical service, supplied and/or installed under this Contract, shall be coordinated and verified with the Mechanical and Plumbing Drawings, the Mechanical and Plumbing Sections of these Specifications, and with the manufacturers of the mechanical and plumbing equipment supplied. This shall include the voltage, phase, and ampacity; conduit requirements; and exact location and type of disconnect, control, and/or connection required. Any changes from the Drawings and Specifications required as a result of this coordination shall be part of this Contract.
- C. Electrical Contractor shall furnish and install the following for all mechanical equipment:
 - 1. Conduit and wiring for line voltage power to the equipment.
 - 2. Disconnect switches.
 - 3. Manual motor starters.
 - 4. Magnetic motor starters when part of a motor control center. See Division 16 and Drawings for further information.
- D. The work under this Section shall include furnishing and installing all controls on low and manual line voltage, including thermostats, auxiliary switches, relay wiring, interlock wiring; equipment control panels and transformers; and controls conduit unless specifically indicated as part of other work. Materials and methods of the control installation shall be in accordance with the Electrical Specifications.
- E. The Mechanical Contractor shall review all wiring connections which have any influence on this equipment or work and verify that these connections are correct

before permitting any equipment to be operated which is furnished, installed, or modified under this Contract.

3.10 ELECTRICAL EQUIPMENT ROOM PRECAUTIONS

- A. Ductwork or piping for mechanical systems shall not be installed in any switchgear room, transformer vault, telephone room or electric closet except as indicated. In any case, no ductwork or piping for mechanical systems shall be installed in the space equal to the width and depth of any electrical service equipment, switchboards, panel boards, or motor control centers and extending from the floor to a height of six feet above the equipment or to the structural ceiling, whichever is lower.

3.11 CUTTING AND REPAIRING

- A. No cutting shall be done except with **Architect's** approval. Cutting of structural members or footings is prohibited without the prior written consent of the Structural Engineer.
- B. Where cutting of paving, walls, ceilings, etc. is necessary for the installation of the mechanical work, it shall be done under the direction of this Section. Damage caused by this cutting shall be repaired to match original and adjacent surfaces without additional expense to the **Owner**. Cutting of new construction shall be by the installing Contractor of that construction as directed by this Contractor.

3.12 PIPE AND VALVE IDENTIFICATION

- A. Identify all piping contents with letter legend on color background identifying hazard or use of material.
- B. The pipe marker system shall conform completely with "The Scheme for Identification of Piping Systems" (ANSI A13.1 1999 or latest edition). More specifically, the pipe marker must possess the following:
 - 1. ANSI specified color coded background.
 - 2. ANSI specified color of legend in relation to background color.
 - 3. ANSI specified legend letter size.
 - 4. ANSI specified length of color field (marker length).
- C. All pipes 3/4" I.D. and smaller shall be marked with 1 1/2" brass tags equivalent to valve tags.
- D. Provide flow markers consisting of labels similar to pipe markers with a large black arrow printed on same background color to indicate direction of flow.
- E. Place pipe marker and flow marker on each pipe on both sides of walls or floors through which pipes pass. Place markers adjacent to valves and fittings or branch

take-off and for exposed piping locate markers to be clearly visible to person standing on floor, and at not over 30'-0" intervals on all straight runs of pipe.

- F. All valves under 3/4" I.D.: 18 gauge brass identification tags 1 1/2" in diameter with depressed 1/2" high black filled letters above 1/2" black filled numbers. Tags shall be fastened securely at specified locations. Valve tags shall show valve number, purpose, and normal condition (open or closed).
- G. Tag Locations:
 - 1. Adjacent to each valve and fitting except on plumbing fixtures and equipment.
 - 2. At each branch and riser take-off.
 - 3. At each pipe passage through wall, floor, and ceiling construction.
 - 4. At each pipe passage to underground.
 - 5. On all horizontal pipe runs, marked every 25'-0".

3.13 SLEEVES AND SEALING

- A. Provide sleeves for all pipes and ductwork passing through new floors, walls, partitions, and any other building construction, of adequate diameter to allow minimum of 3/4" clearance all around between sleeve and pipe or ductwork. Sleeves are not required for holes drilled through existing floors, walls, or partitions (in which case leave specified clearance between hole and pipe or ductwork). When pipe or ductwork is insulated, insulation shall pass continuously through sleeve with 3/4" clearance between insulation and sleeve or hole in existing construction.
- B. Lay out work prior to concrete forming. Reinforce sleeves to prevent collapse during forming and curing.
- C. All floor sleeves required shall extend 1" above finished floor except through mechanical equipment room floors and shafts where sleeves shall extend 2" above finished floor level. Sleeves through roof shall extend 8" above roof. Wall sleeves shall be flush with face of wall unless otherwise indicated. Waste stacks using carriers shall have sleeves flush with floor and sealed.
- D. Sleeves shall permit free thermal expansion of pipe without binding or contact with structure.
- E. Do not support pipes by resting pipe clamps on floor sleeves. Supplementary members shall be provided so pipes are floor supported.
- F. Special sleeves detailed on Drawings shall take precedence over this Section.
- G. Pipe sleeves as scheduled below unless otherwise indicated:
 - 1. Plaster or Drywall:

18 gauge galvanized steel

2. Concrete or Masonry Walls and Concrete Bases:
See Paragraph 3.7.

H. Waterproof membraned floors, walls, concrete pits, foundation walls, etc. as detailed or specified in other Sections.

I. Duct Sleeves: Should be as follows unless otherwise indicated. Sleeves specified or indicated at fire dampered penetrations shall take precedence over this article.

1. Plaster or Drywall:
18 gauge galvanized steel
2. Concrete Floors and Mechanical Equipment Room Floors:
See Paragraph 3.7.

J. Sealing of Sleeves or Holes:

1. Waterproof Sleeves or Holes in Floors and Walls: Seal space between pipe and sleeves in exterior walls, foundations, walls, pits, etc. watertight using Link-Seal modular wall and casing seal, or as detailed.
2. Fire Rated Wall and Floor Sleeves or Holes (Insulated Pipe): Caulk space between pipe insulation and sleeve with 3-M brand Fire Barrier Sealant CP-25WB+ or Dow/Corning #3-6548 Silicon RTV Foam, with thickness appropriate for floor or wall fire rating. Seal top of floor sleeve with Tremco Dymeric Sealant.
3. All other sleeves or holes: Sleeves shall be packed with safing insulation and sealed with Tremco Dymeric Sealant.
4. Trim Plates: Provide minimum 1" trim plates at visible sides of openings on all exposed ducts passing through floors, walls, partitions, plaster furring, etc. unless otherwise specified or indicated. Plates shall be prime coated.

3.14 SUPPORTS

- A. All equipment, plenums, piping, and ductwork shall be mounted on, or suspended from, foundations and supports as specified and indicated, and seismically braced to structure.
- B. Supplemental Supports: Provide supplemental supports to span building structural elements as necessary for equipment foundations and supports. Provide Shop Drawings to Mechanical and Structural **Engineers** for approval prior to installation.

3.15 INSTALLATION AND ALIGNMENT

- A. Fan and motor pulleys shall be carefully aligned and belt tension properly adjusted by manufacturer's representative or qualified mechanic in accordance with manufacturer's instructions.
- B. Pumps shall not be operated for testing purposes unless systems are filled. Any damage during set-up and testing shall be repaired at no additional cost to **Owner**.

3.16 ACCESSIBILITY

- A. General: Valves, damper operators, filters, thermometers, pressure gauges, clean-out fittings, and indicating equipment or specialties requiring reading, adjusting, inspection, repairing, removal, or replacement shall be conveniently and accessibly located with reference to finished building. Thermometers and gauges installed to be easily read from floor.
- B. Panels: No unions, flanges, valves, dampers, controls, or equipment shall be placed in a location that will be inaccessible after the system is complete. Access panels or doors shall be provided where required whether or not shown on Drawings.
- C. Access Panels in Walls or Ceilings:
 - 1. Provide access panels in walls or ceilings. Milcor or approved equal, where indicated and where required to provide access to valves, dampers, and other appurtenances. Panels shall be style as selected by Architect and as directed by wall or ceiling construction. Panel size shall be 24" x 24" unless indicated otherwise. Panels in acoustical barriers shall have same transmission loss as barrier. Panels in rated construction shall have same rating as construction in which installed.
 - 2. Door panels shall be no lighter than 14 gauge steel. Doors shall be equipped with concealed spring hinges and flush, screwdriver operated locks, except that key operated locks shall be used for all access doors in walls where door is within 6'-0" of floor. Locks for all key operated doors shall be keyed alike.
 - 3. Doors in ceramic tile surfaces shall be stainless steel or chrome plated. Doors in other finished surfaces shall be prime coated.
 - 4. Doors in fire rated grease exhaust duct shafts shall be fire rated and openable without the use of tools.
- D. Equipment Spaces: Provide aisles between equipment and ducts, electrical gear, etc. for complete service and inspection of equipment. Maintain minimum 6'-6" headroom in all access aisles. Maintain minimum 36" clearance at all service panels. Provide minimum clearances at electrical equipment per NEC. Provide 36" wide, 3/4" thick plywood covered catwalks in attics from access door to equipment.

3.17 TESTING

- A. Test all piping, ductwork, equipment, and systems as called for in the Specifications. Notify **Architect** and inspection authorities prior to testing so that they may be witnessed. Protect all personnel and equipment during testing. Where Specifications do not cover specific points or methods, conform to manufacturer's specifications.

3.18 DEMOLITION

- A. Extent of building demolition work is as specified in Division 01.
- B. Removal, storage, or disposal of existing equipment, plumbing fixtures, fans, radiators, piping, boilers, etc. shall be under the direction of the **Architect**.
- C. Provide a detailed sequence of demolition and removal work to ensure uninterrupted progress of **Owner's** on-site operations.
- D. There is a possibility that materials containing asbestos may be encountered. Advise the **Owner** in a timely manner of its presence and in accordance with EPA regulations.

3.19 DUCTWORK OPENINGS

- A. Locating and sizing of all openings for ductwork through walls, roof, etc. shall be done under this Division. Framing of openings shall be done by the respective trades in whose work the opening is made.

3.20 EQUIPMENT

- A. All equipment shall be accurately set and leveled. Supports shall be neatly placed and properly fastened. All equipment shall be fastened in place with bolts.
- B. Keep all openings closed with plugs or caps to prevent entrance of foreign matter. Protect all piping, ductwork, fixtures, and equipment against dirt, water, chemical, or mechanical damage both before and after installation. Any equipment or apparatus damaged prior to final acceptance shall be restored to original condition or replaced at the **Architect's** discretion and at no additional cost to the **Owner**.
- C. Start-Up: Equipment shall be adjusted, lubricated, aligned, etc. prior to start-up. Inspect each piece of equipment prior to start-up. Start each piece of equipment in accordance with manufacturer's directions and warranty requirements.
- D. Finish: Protect all equipment and materials until in use. Any visible rust or corrosion shall be removed as directed prior to installation. All damaged factory painted finishes shall be cleaned and painted with manufacturer provided paint.

3.21 MANUFACTURER'S DIRECTIONS

- A. Materials and equipment shall be installed in accordance with manufacturer's application and recommendations, requirements, and instructions, and in

accordance with Contract Documents. Where manufacturer's instructions differ from those indicated or specified, they shall be brought to **Architect's** attention for resolution prior to equipment ordering and installation.

- B. Where requirements indicated in Contract Documents exceed manufacturer's requirements, Contract Documents shall govern.

3.22 FURRING AND PIPE SPACES

- A. Spaces provided in the design of the building shall be utilized and the work shall be kept within the furring lines established on the Drawings.
- B. Layout: Maintain maximum head room under piping and equipment. Contractor to coordinate line locations with beams, windows, etc. to provide maximum clearance. From Drawings, ascertain heights of suspended ceilings and size of pipe shafts in which piping is concealed, and location and size of structural members in and adjacent to pipe shafts. Coordinate piping installation with ductwork, lighting, and other equipment. Ensure necessary clearances on trim plates at exposed penetrations of walls and floors. If sufficient room is not available above suspended ceiling or vertical shafts obtain clarification from **Architect** before work is started.

3.23 CLEAN-UP

- A. During the course of work under this Section, all rubbish, debris, surplus materials, tools, etc. resulting from this work shall be removed from work area and shall be disposed of off-site at the end of each working day. The **Owner's** premises shall be left clean and in a condition acceptable to the **Architect**.
- B. Clean all work installed under this Contract to satisfaction of **Owner** and submit documentation that each system has been cleaned and results witnessed by the **Architect's** representative.
- C. All water distribution and piping systems, including those for cold water and hot water systems, shall be flushed thoroughly until piping is cleaned to satisfaction of the **Architect**. See other Specification Sections for additional requirements.
- D. Remove debris and trash from ductwork, fan units, and all air handling equipment. Vacuum clean fan housing, coils, and ducts in vicinity of openings before grilles and registers are installed. Replace construction filters with new filters prior to project completion.

3.24 ENGRAVED NAMEPLATES

- A. Furnish and install plastic laminated engraved nameplates with 1/4" minimum lettering at panel mounted control devices, manual control stations, power disconnects, motor starters and pieces of equipment. Nameplates exposed to weather shall be engraved brass.

3.25 FINAL INSPECTION

- A. The Contractor shall furnish the **Architect** with certificates of final inspection and approval from the inspection authorities having jurisdiction.

3.26 GUARANTEE

- A. The Contractor shall guarantee the quality of all work and the quality of equipment and materials in accordance with the provisions of the General Conditions and Special Conditions. Should any defects occur during this period, the Contractor shall promptly repair or replace defective items as directed by the **Architect**, without cost to the **Owner**.

3.27 SITE VISITS BY ENGINEER

- A. **Engineer's** responsibility is limited to normal construction support services only, consisting of office consultation, site visits, and reports to the **Architect** at appropriate stages of construction such as rough-in, pre-final, and final. All costs incurred by the **Engineer** for additional site visits or office work required to complete the project as the result of incomplete coordination or supervision by the Contractor or the Mechanical Sub-Contractor shall be paid for by the Contractor.

3.28 OPERATING AND MAINTENANCE MANUALS

- A. Three (3) complete sets of bound instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished to the **Owner** within ninety (90) days of issuance of final occupancy permit. Each set shall be permanently bound and shall have a hard cover. The following identification shall be inscribed on the covers, "OPERATING AND MAINTENANCE INSTRUCTIONS", the name and location of the building, the name of the Contractor, and the Contract number. Flysheets shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8 1/2" x 11" with large sheets of Drawings folded in. The instructions shall include, but not be limited to, the following:
 - 1. System layout showing piping, valves and controls with complete valve and control identification, listing, and indexing valve charts.
 - 2. Approved wiring and control diagrams.
 - 3. A detailed control sequence describing start-up operation and shut-down with reference to valve and control names and numbers.
 - 4. Operating and maintenance instructions for each piece of equipment including lubrication instructions. Include information on frequency of lubrication, filter change, belt adjustment, cleaning, adjusting, etc.
 - 5. Manufacturer's bulletins, cuts, and descriptive data.
 - 6. Parts list and recommended spare parts including name and address of source of supply.

- B. Field Instructions: Upon completion of the work and at a time designated by the **Owner** the services of one or more competent **Engineers** shall be provided by the Contractor to instruct a representative of the **Owner** in the operation and maintenance of the systems. These field instructions shall cover all the items contained in the bound instructions and shall be of a sufficient length and detailed nature, in the **Engineer's** judgment, to insure safe and efficient operation.

**** END OF SECTION ****

**SECTION 210500
FIRE PROTECTION SYSTEM**

PART I - GENERAL

1.1 GENERAL

- A. The General Conditions, any Supplementary Conditions, Section **200050**, *Mechanical General*, and Division **1** are hereby a part of this Section as fully as if repeated herein.

1.2 SCOPE

- A. Furnish all labor, materials, equipment and services required for and/or reasonably incidental to the completion of the complete hydraulic calculated sprinkler system per NFPA 13 and other governing agencies.

1.3 APPROVALS

- A. Obtain written approval from the following agencies for submittal requirements:
1. Fire Marshal:
 - a. **Cal-Fire**
 - b. **City of Hollister.**

1.4 WORK INCLUDED IN THIS SECTION

- A. Furnish all labor, materials, equipment and services required for and/or reasonably incidental to the completion of the following work:
1. Complete hydraulic wet-pipe automatic fire sprinkler system through all portions of the building. Buildings shall be calculated for Ordinary Hazard, plus 250 GPM hose flow.
 2. Sprinkler heads and piping are required at all areas shown on Architectural Drawings.
 3. All painting of portions of the fire protection system required to be primed and painted by the local Fire Marshal, building department, **Architect** or Rating Agency. See also Section 099113 *Interior Painting* and 099123 *Exterior Painting*
 4. Conformance to all design requirements of the local Fire Marshal and the Rating Agency. Preparation of all required Shop Drawings and details for the approval and installation of the system.
 5. Arranging for all required inspections by the local official and by the Rating Agency. Cost of all testing and of special inspections required by them.

1.5 CODE REQUIREMENTS

- A. All work shall conform to the requirements of the applicable Federal, State and local building and safety codes, ordinances and regulations.
- B. Special attention shall be given to local fire regulations and the regulations of the local fire department and building department.
- C. Nothing in this Specification or on the Drawings shall be construed as permitting a departure from any applicable Federal, State or local building and safety code, ordinance or regulation, or from any requirements of the local fire department, building department and/or Rating Agency.

1.6 SUB-CONTRACTOR QUALIFICATIONS

- A. This Contractor must be a C-16 Contractor, licensed by the State of California Contractor's Licensing Board. No portion of the fire protection system (performed on the job site) shall be subcontracted.
- B. This Contractor must prepare and submit Shop Drawings and inspection certificates prior to submitting to the local Fire Marshal and the Architect, in a timely manner.

1.7 SHOP DRAWINGS AND SUBMITTALS

- A. Shop Drawings and material submittals for the work under this Section shall be submitted to the Architect for approval prior to submitting to fire department and starting any work.
 - 1. Submit six (6) blue-line or black-line sets of Shop Drawings prior to installation. Shop Drawings shall be submitted for interim approval to the Architect prior to approval by Fire Marshal and Rating Agency.
 - 2. Submit six (6) sets of the material lists and manufacturer's cuts. This shall include all material to be used on the job. Substitution of material shall be approved by the Architect prior to installation.
 - 3. Shop Drawings shall show all details and information required by NFPA 13 and/or NFPA 24. In addition, all earthquake bracing (longitudinal and lateral) shall be shown. If unnecessary deviation from Drawings are made by Contractor which cause additional cost to the Owner, Contractor shall submit the changes to the Architect for compliance verification and the additional cost shall be borne by the Contractor.
 - 4. Shop Drawings submitted for final inspection shall bear the stamps of approval/acceptance of all agencies (local officials and Rating Agency) on each sheet of the same six (6) sets of Shop Drawings.
 - 5. Shop Drawings submitted for final acceptance shall be accompanied by the Letter of Comment from the local Fire Marshal and the Rating Agency.

6. Final Record Drawings shall be submitted in accordance with Paragraph A above and paragraph Record Drawings of this Section, showing exact dimensional locations of all underground piping and of all risers, mains and cross-mains.
7. On completion of the job, furnish the Architect with a copy of the "Contractor's Material and Test Certificate" (Part A and/or B), signed by the local Fire Marshal, and a copy of the Transmittal Letter sending the certificate to the Rating Agency.

1.8 DESIGN OF SYSTEM

- A. All work shall be designed in accordance with the requirements of local Fire Marshal, the latest editions of NFPA 13, 14, and 24 and the appropriate edition of the California Building Code and the California Fire Code (as modified by local ordinance or ruling).
- B. Each building's sprinkler system shall be hydraulically calculated for the hazards or commodity indicated in Section 1.4.
- C. Calculations shall be based upon the water supply available at the connection with the City water main. Sprinkler Contractor shall be responsible for representative accurate water test.
- D. The Sprinkler Contractor shall refer to the Architectural, Structural, Mechanical, and Electrical Drawings and coordinate the system layout to not interfere with the arrangement of lighting fixtures, grilles, diffusers, ductwork, equipment and piping.
- E. **All piping shall be installed for routing as shown on Drawings, including cross-mains, if shown.** Also, piping shall be installed as close as practical to the roof structure so as to provide the maximum possible clear height. Cross-mains shall follow the roof line (tight to the bottom of the beams, purlins or joints) so as to remain at an approximately constant distance from the roof throughout.
- F. Fire protection system lines shall be designed so as to avoid all other utility lines, conduit and structural components shown on the Drawings. Fire protection system lines must give way to all gravity lines. Notify Architect if conflicts cannot be coordinated in the field.
- G. Cutting structural members shall not be allowed, unless otherwise approved by the Structural Engineer or the Architect.

PART II - PRODUCTS

2.1 MATERIALS

- A. All materials shall be new and currently listed in the Underwriters' Laboratories, Inc. Fire Protection Equipment List and shall be acceptable to the local Fire Marshal. Material that is pending approval shall not be acceptable.

- B. Above ground piping to be ANSI/ASTM A53 electric resistance welded and seamless carbon steel pipe. 1 1/2 in. and smaller use Schedule 40 with threaded fittings, 2" and greater shall be welded or roll grooved, minimum wall thickness for 300 psi in accordance with Schedule 10 up to 5 in., 0.134 in. wall for 6 in. pipe, and 0.188 in. wall for 8 in. and 10 in. pipe.
- C. Overhead piping, fittings and hanger material shall conform to the requirements outlined in NFPA 13, Chapter 3.
- D. Chrome plated escutcheon plates shall be provided where sprinkler piping passes through walls, floors or ceilings.
- E. The escutcheons shall be the same size throughout the building and shall match ceiling decor.
- F. A metal box containing replacement sprinkler heads shall be mounted near the riser inside the building and shall contain at least **6** heads and at least **2** of each type of head installed in the building. Also included shall be one wrench for each type of head used in the building.
- G. Bushings shall not be used unless specifically approved by the Architect.
- H. Provide and install head guards on sprinkler heads in areas where they could be damaged (stairwells, mechanical rooms, electrical rooms, emergency generator rooms, etc.).

2.2 HANGERS, INSERTS, AND SUPPORT

- A. General: Provide hangers, brackets, supports, anchors and related appurtenances as required to support all piping and equipment provided under this Section. Piping and equipment supports shall conform to **NFPA 13**.
- B. Piping supports shall conform to hanger details on Drawings and **NFPA 13**.
- C. Manufacturers: Superstrut, Elden, Fee and Mason, Grinnell or approved equal.
- D. Floor Supports: Provide, where required, necessary floor supports for piping and equipment. Supports shall be fabricated from structural members or shall be masonry piers.
- E. Sway Bracing: Per NFPA 13

2.3 SPRINKLER VALVES

- A. Manufacturer: Selection based on Stockham. All valves must be submitted and meet rating as scheduled below. No foreign manufactured valves shall be used.
- B. Valve pressure not less than 175 PSIG, except drain valves.
- C. Valves:

Valve Type	Fig. No.	Material	Working Pressure W.O.G.
Isolation / Sprinkler Control Valve (OS&Y)	G-667	Iron Body Bronze Mounted	250 PSIG
Drain Valve	G-679	Iron Body Bronze Mounted	150 PSIG

2.4 SPRINKLER HEADS

- A. Exposed Ceiling Construction: Exposed upright automatic fusible link type, plain brass finish, equal to **Tyco, TY-FRB**.
- B. Finished Ceiling: Contractor to check with **Architect** on color to have manufacturer paint cover plates.
 - 1. Concealed: Concealed pendant automatic fusible link type, equal to **Tyco, "Royal Flush II"**.
 - 2. Recessed: Recessed pendant automatic fusible link type, equal to **Tyco, TY-FRB**.
- C. Sidewall Heads: Contractor to check with Architect on color to have manufacturer paint cover plates.
 - 1. Recessed horizontal sidewall automatic fusible link type equal to **Tyco, TY-FRB**.
- D. All heads, except as noted, to have temperature rating at **165°F/286°F**. Set head at and around heating devices suitable under normal operation to eliminate false alarm by generated heat.
- E. Submittal: Submit **2** of each type of sprinkler head, complete with canopy, for Architect's review prior to ordering heads.

PART III - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Prior to bid, visit the job site and familiarize with local conditions, including verification of the location of the existing utilities.
- B. All piping shall be installed in a manner acceptable to the local, City or Cal Fire Fire Marshal.
- C. All piping shall be pressure tested and flushed according to the procedures set forth in NFPA 13 and NFPA 24, and witnessed by the General Contractor and Fire Marshal.

- D. All equipment installed under this Contract shall be properly earthquake braced. This Contractor shall be responsible for the proper design and installation of the equipment and for satisfying the City of Hollister Fire Marshal that these requirements have been met. Shop Drawings shall show locations of earthquake bracing, both lateral and longitudinal.
- E. All equipment installed under this Contract shall be protected from external damage. This Contractor shall be responsible for the proper design and installation of the equipment, and for satisfying the City of Hollister Fire Marshal, and the Architect that these requirements have been met. Shop Drawings shall show details of protective equipment.
- F. This Contractor shall be responsible for any damage to other work caused by this installation or by leaks in the fire protection lines.
- G. This Contractor shall be responsible for coordinating his/her work with the General, Electrical, Mechanical, and Plumbing Contractors, and with other trades.
- H. All work shall be done in a neat and workmanlike manner. All heads to be located on center or quarter points of ceiling tiles unless otherwise noted. Location of sprinkler heads shall take note of obstructions.
- I. Escutcheons shall not be permitted closer than 6" to T-bar ceiling members if conflicts with lights or grilles do not permit the centering of the heads in the tiles. Architect shall have final approval on exact location of sprinkler heads. Escutcheons shall not be mounted closer than 6" to any other ceiling mounted device.

3.2 TOOLS

- A. All special tools for proper operation and maintenance of the equipment provided under this Section shall be delivered to the **Owner's** representative and a receipt requested for same.

3.3 IDENTIFICATION

- A. Valves:
 - 1. Attach 1 -1/2" square brass tags stamped with designating number 1/2" high, filled in with red enamel, to each valve.
 - 2. Securely fasten valve tag to valve spindle or handle with a brass chain.

3.4 SPRINKLER DRAINS AND TEST CONNECTION

- A. Provide all necessary drain valves, drain risers, capped nipples, auxiliary piping, etc. as required to drain the system risers and mains, and all trapped portions of the system. Drain valves which are not connected to drain pipes leading to floor drains shall be hose end type.

- B. Main drains and test connections shall be piped to spill on/in floor drain or grade on concrete splash block.
- C. Provide all piping required to spill the drains and test connections to the floor, funnel or other drainage connections provided under the plumbing contract, or arrange with the plumbing trade to provide additional drainage facilities, in which case pay all charges related to the additional plumbing construction work.

3.5 TAGS

- A. Provide all designated signs on shut-off valves, control valves, alarms, etc. as required by the agencies having jurisdiction.

3.6 TESTING

- A. All sprinkler system piping must be hydrostatically tested for a period of two (2) hours in the presence of the **Owner** or his/her designee.
- B. Test pressure shall be 50 PSI in excess of maximum water pressure or 200 PSI, whichever is greater.
- C. Leakage from any fittings may be corrected by tightening or replacement of defective materials only. Use of sealant materials is expressly prohibited and unacceptable to the **Owner** as a corrective measure.
- D. Gauges used in testing shall be identified as to accuracy, or provided by **Owner**, at his/her option.
- E. Blind flanges or inserts used for testing shall be placed in the system and removed from the system in the presence of the **Owner** or his/her designee. These devices shall be clearly marked and vividly painted to permit casual observance of their addition to the system.

3.7 RECORD DRAWINGS

- A. Keep a current set of Record Drawings on the job at all times. These Drawings shall be updated as changes are made and shall be kept in the Construction Office. Also, see Special Conditions and Mechanical General, Section 15050.
- B. Keep a current set of Specifications and material lists, with catalog cuts, in the Construction Office at all times.
- C. On completion of the project, submit to the Architect, three (3) copies of a loose leaf manual containing manufacturer's cuts for all equipment.

3.8 CLEAN-UP

- A. Perform the work under this Section so as to keep affected portions of the site neat, clean and orderly at all times. Upon completion of the work under this Section, immediately remove all surplus materials, rubbish and equipment associated with or used in the performance of this work. Failure to perform such clean-up operations within 24 hours of notice by the Architect or General

Contractor shall be considered adequate grounds for the work to be done by others at this Sub-Contractor's expense.

3.9 ADDITIONS AND DELETIONS

- A. As part of the bid proposal, the Contractor shall submit a fixed cost price, including all necessary threading, one fitting, one hanger, sprinkler head, and labor for a 10'-0" length of pipe of each size from 1" to 8", and for all valves from 1" to 8" in size. The fixed cost shall be submitted for both the addition to the approved system and the deletion from the approved system design.
- B. An addition and deletion fixed price is also to be submitted to cover labor and equipment for each size system device of the designed system.

3.10 OPERATIONAL AND MAINTENANCE MANUALS

- A. Three (3) complete sets of operational and maintenance booklets shall be supplied to the **Architect** with Record Drawings.

**** END OF SECTION ****

**SECTION 220400
PLUMBING**

PART I - GENERAL

1.1 GENERAL

- A. The General Conditions, any Supplementary Conditions, Section 200050, *Mechanical General*, and Division 1 are hereby a part of this Section as fully as if repeated herein.
- B. Contractor to rough-in, connect, and install **Owner** furnished items.

1.2 SUBMITTALS

- A. Submit for review, within fifteen (15) days after signing Contract, the required number of copies of a complete list of materials proposed for use, including sizes, capacities, etc. See Division 1 and Section **200050** for requirements. This list includes:
 - 1. Plumbing Fixtures and Trim.
 - 2. Drains and Clean-outs.
 - 3. Pipe and Fittings.
 - 4. Valves, Unions, and Hose Bibbs.
 - 5. Pipe Hangers and Supports.
 - 6. Plumbing Equipment.
 - 7. Insulation for Pipe and Fittings.
- B. Copies of a portfolio with a full description of fixtures and trim shall be submitted with the materials list.
- C. No substitute materials or equipment may be installed without the written approval of the **Architect**.
- D. All additional costs incurred by the substitution of material or equipment, or the installation thereof, whether architectural, structural, mechanical, electrical, or plumbing, shall be borne by Contractor who substitutes material or equipment in lieu of that specified.

PART II - PRODUCTS

2.1 SOIL, WASTE, DRAIN, AND VENTING SYSTEMS

- A. Pipe and Fittings:

1. Soil, waste, drain, and vent (above grade) pipe shall be ABS-DWV Schedule 40 (ASTM D-2661) and shall be IAPMO approved, with solvent weld socket fittings.
2. Soil, waste, drain, and vent (below grade) shall be ABS-DWV (SDR-35) per ASTM 2751 and shall be IAPMO approved with solvent weld socket fittings.

2.2 WATER PIPING SYSTEM

- A. All potable water system materials shall comply with NSF/ANSI Standard 61, Annex G for low lead requirements of 0.25% lead content.
- B. Piping:
 1. Inside the building: Hard copper water tube, conforming to ASTM B88, Type "L", with wrought copper fittings.
 2. Cold water to 5'-0" from the building shall Schedule 40 PVC, PVC Class 200, pipe with solvent joints (rated at 200 PSI fittings).
- C. Valves: All valves shall be the product of a single manufacturer – Milwaukee or NIBCO, 125 PSIG steam service rated and 300 PSI air and water rated. All valves shall be low lead type per NSF/ANSI standard 61.
 1. Ball Valves: Milwaukee UPBA100 standard port screwed, bronze valve.
 2. Check Valves: Milwaukee UP509T screwed, bronze, swing check (provide non-slam check on pumped equipment or quick-closing fixtures).
- D. Unions: Mueller #C-107, Crane, or approved equal in copper piping; Stockham Figure 694, Crane, or approved equal, galvanized malleable iron, brass seat in steel lines; EpcO, Crane, or approved equal, dielectric unions where copper connects to steel.
- E. Shock Absorbers:
 1. Provide on hot and cold water lines at quick closing valves such as flush valves, solenoid valves, etc.
 2. Sized and located in accordance with Plumbing and Drainage Institute Manual WH 201.
 3. Provide access panels at locations where shock absorbers are not accessible. See applicable paragraph for types. Location to be approved by the **Architect**.
- F. Pipe and Fitting Insulation:
 1. Hot water piping shall have Owens-Corning ASJ/SSLII (all service jacket with pressure sensitive tape closure system), average thermal

conductivity at 70°F mean temperature, 0.23 per inch of thickness. Seal longitudinal joints with SSLII closure system and seal butt joints with 3" tab. Fittings to be preformed, factory fabricated of same materials and covering as insulation, seal butt joints with 3" tabs. Insulation for runouts shall comply with Table 120.3-A of the California Energy Efficiency Standards.

For systems operating between 105°F and 140°:

- a. For piping smaller than 1", provide 1" of insulation.
- b. For piping 1" and larger, provide 1-1/2" of insulation.

For systems operating between 141°F and 200°:

- a. For piping smaller than 1-1/2", provide 1-1/2" of insulation.
 - b. For piping 1-1/2" and larger, provide 2" of insulation.
- G. Access Panels: MILCOR or approved equal, prime coated, size determined by equipment requiring access. Access panels in restrooms shall be stainless steel.

2.3 GAS PIPING

- A. Piping Above Ground: Standard weight black steel pipe, Schedule 40, ASTM A53 with 150# black malleable iron fittings.
- B. Piping Wrap: To extend a minimum of 6" above grade on risers.
- C. Gas Cocks: For high pressure gas service use Dezurik Series 400 lubricated gas cock with RS49 or RS51 plug seals, UL listed. On low pressure interior service lines use Milwaukee BB2-100 Butterball, NIBCO, or approved equal.
- D. Unions: #150 malleable iron ground joint.

2.4 PIPE HANGERS AND SUPPORTS

- A. Clevis Hangers: Superstrut C-727, UL and FM approved, solid all thread rods and rod clips. Superstrut 540 for wood construction and C-755 or C-769 for I-beam clamps. Pre-drill and secure with lag bolts.
- B. Supports and Beam Clamps: Superstrut C-769, Hubbard Holdrite, or approved equal.
- C. Concrete Inserts: Superstrut 452 for concrete construction installed with reinforcing bar.
- D. Trapeze Hangers: Superstrut, Hubbard EZ-Strut, or equal, channel with pipe clamps and guides as required (include type to be used in submittals).
- E. Riser Clamps: Superstrut, Hubbard Holdrite, or approved equal.
- F. Offset Pipe Clamps: Superstrut, Hubbard Holdrite, or approved equal.

- G. Pipe Isolation: Hubbard Holdrite Silencer System.
- H. Sway Bracing: Where hanger rods on horizontal runs of 2 1/2" pipe and larger are 12" in length or longer from support point to top of pipe, there shall be one 3/16" x 1 1/4" steel angle brace, Superstrut (A-1200 channel) bolted to every other pipe hanger clamp and anchored to the structure. Stays to ceiling or roof shall rise at a 45° angle and be anchored per the Drawings. Alternate braces shall be installed on opposite sides.
- I. Plumbers tape or sheetmetal straps shall not be used for hanging or supporting of pipes.
- J. Space hangers and supports for horizontal copper and steel pipe according to the following schedule:

Pipe Size	Maximum Spacing	Rod Size
1/2"	5'-0"	3/8"
3/4" to 2"	6'-0"	3/8"
2 1/2" and 3"	10'-0"	1/2"
4"	14'-0"	5/8"

- K. Space hangers and supports for horizontal CPVC according to the following schedule:

Pipe Size	Maximum Spacing	Rod Size
1/2" to 1"	3'-0"	3/8"
1-1/4" to 2"	4'-0"	3/8"
2 1/2" and 3-1/2"	4'-0"	1/2"
4"	4'-0"	5/8"

- L. Provide two (2) hangers per section of horizontal cast iron pipe and within 18" of each joint.

2.5 PIPE SIZES TO EQUIPMENT

- A. Pipe sizes indicated, including required valving, shall be carried full size to equipment served. Any change of size to match equipment connection shall be made within 1'-0" of equipment. All temperature control valves with sizes smaller than connected lines, reduction shall be made immediately adjacent to valve.

2.6 THERMOMETERS

- A. General: Thermometers with separable wells, straight or angle mounted, as required, and installed in piping systems to be easily read. Provide extension

necks where required to clear insulation. Separable sockets in ferrous piping systems and non-ferrous systems, brass or bronze. Install thermometers where easily read from floor. Install wells in oversized tees in path of water flow to be measured so that area around well is same as adjacent pipe. Install where indicated and as stated below.

- B. Temperature Ranges: Shall be within 10°F of the following: Submittal shall list specific range proposed for each application stated below:
 - 1. Domestic Hot Water: 30-180°F with 2-degree divisions.
- C. Liquid-In-Glass Thermometers: Red-reading type with 9" Fahrenheit scale, enclosed in metal, glass covered case, magnified fluid column.
- D. Vapor-Actuated Dial Thermometers: Bourdon tube 4 1/2" round type with Fahrenheit scale, stainless case, glass covered face.
- E. Manufacturers: Marshalltown, Taylor, H.O. Trerice Co., or Weksler.

2.7 CLEAN-OUTS

- A. General: Provide Zurn, Josam or Jay R. Smith clean-outs where indicated and required by code. Same size as main with maximum size of 4". Zurn numbers used as basis of selection unless otherwise noted.
- B. Floor Clean-outs (FCO): Zurn ZN1400-2 round top floor clean-out with nickel-bronze head.
- C. Wall Clean-outs (WCO): Zurn ZN1460-8 clean-out, cast brass countersunk plug, and stainless steel access cover plate secured to plug by countersunk screw. For hub pipe, Zurn ZN1440-1.
- D. Unfinished Areas (GCO): Zurn Z1420-25 cast iron clean-out, fitted with brass countersunk plug. For hub pipe, Zurn Z1440.
- E. Grass or Planting Area (CO): Zurn 1449 located in a concrete box and cover or **in cast iron box and cover with concrete apron per project details.**

2.8 UNIONS AND FLANGES

- A. Unions: Provide unions as follows:
 - 1. At each threaded or soldered connection to equipment and tanks.
 - 2. At one threaded connection to each manually operated threaded valve and cock and each threaded check valve.
 - 3. At each connection to threaded or soldered automatic valves.
 - 4. Other locations as indicated.

2.9 TRAP PRIMERS

- A. Precision Plumbing Products shall be used only where following cannot be located.
- B. Trap Primer Valve: Automatic trap primer valve, Precision Plumbing Products Primer Valve No. 1 non-adjusting, for maximum of two (2) drains.

2.10 TRAPS

- A. General: Provide traps on all fixtures connected to soil systems, except for fixtures having integral traps, and arrange so discharge from any fixture will not pass through more than one trap before reaching sewer. All traps shall have seal of not less than 2", nor more than 4".
- B. Exposed Pipe: Exposed traps for fixtures shall be chromium plated 17 gauge cast brass as specified under Fixtures Paragraph.
- C. Cast Iron Traps: Traps installed in connection with cast iron pipe shall be same quality and grade as pipe.

2.11 HOSE BIBBS

- A. General: Provide all hose bibbs or hydrants with vacuum breakers. All hose bibbs to have removable metallic handles and lockshield. See Plumbing Fixture Specification on drawing.

2.12 DRAINS

- A. General: Provide Zurn, Josam, or Jay R. Smith drains of sizes shown and types herein specified. Drains inside caulked or threaded outlet as required. Provide clamping collars for drains in areas except slab on grade and trap primer connections on all drains. Zurn numbers used as basis of selection unless otherwise noted. Indirect receptors (floor sinks) shall be installed with overflow rim 1" above finished floor. See Plumbing Fixture Specification on drawings

2.13 PLUMBING FIXTURES

- A. General: Provide new plumbing fixtures of type herein specified and quality shown. Lavatories and sinks to be provided with number of holes required by faucet only, unless otherwise specified.
- B. Fixtures: Complete with fittings, supports, fastening devices, faucets, valves, traps, and appurtenances required.
- C. Vitreous Ware: Non-absorbent china of even color and unmarked.
- D. Porcelain Lined Ware: Constructed of smooth, sound iron castings, properly finished, and provided with first quality, high temperature enamel.
- E. Fittings and Fixtures: Heavy brass castings properly finished and chrome-plated.

- F. Exposed IPS Piping, Nipples to Stops and Tubing: 85% red brass, chrome-plated.
- G. Escutcheons: Brass, chrome-plated.
- H. Warranty: All fixtures warranted not to craze, color, or scale.
- I. Connections: Equal height, plumb and set at right angles to floor, wall, or both, unless otherwise required or specified.
- J. Fixture Locations: As shown on Architectural Drawings.
- K. Fixture Type: All fixtures shall be by one manufacturer unless otherwise noted.

2.14 MANUFACTURERS

- A. China or Cast Iron Fittings: American Standard or Kohler.
- B. Stainless Steel Fixtures: Just, or Elkay. Minimum 18 gauge stainless steel unless specified otherwise.
- C. Fixture Trim: Where American Standard is specified, Symmons, Kohler, T & S Brass or Chicago shall be acceptable and shall be the product of a single manufacturer.
- D. Carriers: Jay R. Smith, Zurn, or MIFAB. Zurn numbers used as basis for selection where specific selection is shown. Determine from Drawings required hand and type.
- E. Flush Valves: Sloan or Zurn.
- F. Toilet Seat: Olsonite, Church, or Beneke.
- G. Drinking Fountain: Elkay, Halsey-Taylor, or Haws.

PART III - EXECUTION

3.1 EXCAVATING AND BACKFILLING

- A. Perform all necessary excavation and backfill required for installation of mechanical work. Any work damaged during excavation and backfilling shall be repaired at Contractor's expense.
- B. Verification of Existing Conditions:
 - 1. It shall be one of the responsibilities under this Section to examine the site of work and, after investigation, to determine the character of the materials to be encountered and the existing conditions affecting the work.
 - 2. Excavation shall be unclassified and shall include the removal of all buried obstructions within the area to be excavated.

- C. Trench for underground pipelines shall be to the required depths. Maintain excavations free of water while installing pipe and until backfilling.
- D. Tamp bottom of trenches to uniform grade and excavate bell holes where necessary to insure that pipe rests for entire length on solid ground. Should rock be encountered, excavate to 6" below bottom of pipe and rock surface with well tamped and compacted 1/2" to 1 1/2" broken stone or gravel sand before laying pipe.
- E. When piping has been installed, tested, inspected, and approved, backfill excavations with clean earth from excavation or with imported sandy soil in layers not exceeding 8"; moisten and machine tamp and restore the ground or paving to original condition.
- F. Backfill shall be compacted to a density of 90% as determined by the laboratory test procedure in ASTM D1557.
- G. During progress of work, **Owner** may have compaction tests made under direction of testing laboratory for all compacted fill. If found not to meet Specification, Contractor shall excavate and recompact fill at no additional cost to **Owner**.
- H. Following backfilling, grade all trenches to level of surrounding sub-grade. All excess soil shall be located per **Owner's** instructions.
- I. After backfilling, remove from the premises all surplus earth resulting from this work and dispose of same off the site.

3.2 PIPING - GENERAL

- A. Thoroughly clean all pipe and maintain in clean condition during construction temporarily capping or plugging ends of pipe when not being worked on.
- B. Cut pipes accurately to measurements established at the site and work into place without springing or undue forcing and out of the way of openings, ductwork, and equipment; ream ends of screwed pipes and tubing to original bore before connecting together.
- C. Run piping concealed except as noted otherwise with vertical lines plumb and horizontal lines installed to maintain uniform slope.
- D. Protect all piping located over switchboards, electrical machinery, or equipment against condensation.
- E. Arrange water piping for drainage at low points; place drain valves to be accessible.
- F. Isolate all water piping from hangers, walls, etc. with Hubbard Holdrite Silencer System or approved equal, to alleviate any noise transmission when water is flowing.

- G. Make joints in cast iron piping with neoprene compound applied to male threads only.
- H. Make up screw joints with approved pipe joint compound applied to male threads only.
- I. Solder joints in copper tubing with lead free soft solder and flux. All joints to be cleaned bright before soldering.
- J. Where changes in pipe size occur, use only reducing fittings. For drainage pipe changes in direction, use long sweep bends where possible; otherwise, use short sweep 1/4 bends or combination Wye and 1/8 bends. Use sanitary Tee branches only for horizontal branches discharging to stacks.
- K. Unions: Provide screwed unions or flanges in locations required for disconnecting and connecting of all equipment, traps, by-passes, and fixture traps.
- L. Flash roof vent piping through roof with 24 gauge or heavier galvanized flashing. Make watertight with black fibrous mastic. Extend flashing into roofing felt 12" from pipes.
- M. Pipe runs in masonry and concrete floors shall be sleeved for protection. Use SDR 35 PVC piping at least one size larger than piping run.
- N. Chase or sleeve all lines rising in footings and where running concealed through walls.
- O. Caulk space between pipes and sleeves in exterior walls and in concrete slabs with graphite packing and waterproof plastic compound; caulk with Dow Corning #3-6548 Silicone RTV Foam per manufacturer's recommendations at fire walls.
- P. Where pipes pass through slabs with waterproofing membrane, install 16 oz copper flashing sleeves at a minimum of 8" from edge of sleeve. Caulk space between pipe and sleeve with non-hardening mastic.
- Q. Place escutcheons, stamped with #16 gauge steel and chromium plated, on pipes passing through sleeves in walls, floors or ceiling where exposed to view within a finished area. Grout in all other lines.
- R. Water pipe is sized per 5 FPS velocity to eliminate water hammer arrestors. Do not change pipe sizing from Drawings.
- S. Support piping where necessary at sufficiently close intervals (and 24" from each fitting and change of direction) to keep it in alignment and to prevent sagging.
- T. All exposed pipe and trim at fixtures shall be chrome-plated.
- U. Anchor vertical risers with hooks, brackets, or clamps to make rigid.

- V. All changes of direction of piping shall be made with fittings. Do not bend pipe or hard copper water tubing.

3.3 PIPING INSTALLATION

- A. General: Piping installed approximately as indicated, direct as possible without unnecessary offsets or fittings, and parallel with building lines. Install vertical risers plumb. Locate valves for accessibility. Point out to **Architect** when there is an obstacle in the way of valve accessibility before installing valve.
- B. Layout: Maintain maximum head room under piping. Contractor to coordinate line locations with beams, windows, etc. to provide maximum clearance. From Drawings, ascertain heights of suspended ceilings and size of pipe shafts in which piping is concealed, and location and size of structural members in and adjacent to pipe shafts. Coordinate piping installation with ductwork, lighting, and other equipment. Necessary clearances on trim plates at exposed penetrations of walls and floors. If sufficient room is not available above suspended ceiling or vertical shafts, obtain clarification from **Architect** before work is started.
- C. Slopes: Horizontal piping shall slope uniformly without sags or humps to provide for complete drainage of systems and elimination of air. Low points shall have drain valves accessibly located. High points in closed systems shall be vented by manual air vents. Drainage piping shall slope as required by code or as indicated.

3.4 SOIL, WASTE, DRAIN, AND VENTING

- A. Installation:
1. Run piping in the approximate location shown on the Drawings, graded 1/4" per foot in buildings. Lay sewers in straight lines at a uniform grade of 1/4" per foot or as noted on the Drawings.
 2. Keep stopper in mouth of pipe when pipe laying is not in progress.
 3. Install traps and fresh air inlets where required by code regulations.
 4. Extend vents through roof. Vents may be combined in accordance with the Uniform Plumbing Code. (Combination of cross section of all venting piping in each building shall equal the waste size cross section leaving that building.)
 5. Install clean-outs at ends of horizontal runs in excess of 5'-0" and every 100'-0" of horizontal run.
 6. Make up clean-out plugs with graphite and oil to facilitate easy removal.
 7. Deliver to the **Owner** at completion of work two (2) suitable wrenches for each type of clean-out installed.
 8. Take necessary precautions to protect clean-outs during course of construction.

9. All drains shall be properly trapped and vented and supplied with water where required by code authorities. Give special care to drains located in areas that are pitched for drainage so that uniform slope will be obtained.

3.5 WATER PIPING SYSTEM

A. Installation:

1. Extend piping for hot and cold water, including mains, risers and supplies to fixtures and indicated equipment.
2. Pitch piping as required for drainage.
3. Insulate all domestic hot and hot water return piping and fittings.
4. Make changes in pipe sizes with reducing tees or reducer fittings. Use of bushings or street elbows is not permitted.
5. Install a ball valve for 2" and smaller and butterfly valve for 2 1/2" and larger in each domestic water line to each fixture group so that each group can be shut off without shutting down the other parts of the system.
6. Install unions on each branch line that are not flanged type fittings, adjacent to each screwed valve, on all lines connecting to equipment, and where otherwise indicated.
7. Water heater temperature and pressure relief to run to **outside of building +6" above grade**. Provide air gaps as required by code.
8. No water piping will be permitted below slab on grade (unless shown on Drawings).

3.6 GAS PIPING SYSTEM

A. Installation:

1. Arrange with **Owner** and gas supply company before turning meter off for tie-in for new regulator installation in location shown.
2. Make necessary connections to supply service to equipment as shown. Make installation in accordance with requirements of governing codes and the National Fire Protection Association.

3.7 FABRICATION

- A. Cut pipe accurately to measurements established at building; work into place without springing or forcing; and clear all windows, doors, and other openings. Cutting or other weakening of building structure to facilitate piping installation not permitted. Ream all piping to remove burrs and install to permit free expansion and contraction without damage. Make all changes in direction with fittings and changes in main sizes through eccentric reducing fittings with top of

pipe flat. Piping at tanks, converters, generators, pumps, etc. supported independently so pipe weight is not supported by equipment. Provide the following:

1. Swing joints or run-outs to equipment with swing connections, expansion loops, and/or devices at all other points for flexible piping system.
2. Shut-off valves, balancing valves, and unions or flanges at each branch and in supply and return to each item of equipment. Valves and unions or flanges suitably located to isolate each unit; branch circuit or section of piping to facilitate maintenance and removal of all equipment and apparatus.
3. Drain piping from pump glands, relief valves, etc. to spill over open sight drains, floor sinks, or other acceptable discharge points terminating drain line with plain end (unthreaded) pipe and with minimum 1" air gap.
4. Caps or plugs for all open ends of pipe and equipment during installation to keep out dirt and other foreign matter.
5. Necessary temporary connections, valves, oversize flushing connections, pumps, etc. as required to properly clean and test system.

3.8 TESTING, ADJUSTING, AND CLEANING

- A. Test all piping, valves, clean-outs, etc. as listed below and provide the **Architect** with certified copies of test results. The inspection authority having jurisdiction and the supervising **Architect** shall be notified at least 24 hours prior to performance of all tests so that they may be witnessed.
 1. All water piping shall be tested to 100 PSIG with potable water and held for 8 hours without drop in pressure before it is covered and concealed. Equipment and personnel shall be protected from this test pressure.
 2. All gas piping shall be tested to 50 PSIG for 8 hours without drop in pressure. Equipment and personnel shall be protected from this test pressure. Test new piping to existing structures (if any) prior to tie-in to existing gas.
 3. All parts of the soil and waste system shall be tested hydraulically by filling to the highest vent point with water. Piping may be tested in sections but shall be subjected to a head not less than 10'-0". Stand-pipe installed for head test shall be 2" minimum. Test pressure shall be held for 15 minutes before inspection starts and water level shall remain stationary for not less than 1 hour.
- B. Adjust and regulate all faucets, valves, water heating equipment, etc. and turn over to the **Owner** in perfect working order.
- C. Floor drain strainers and clean-out covers shall be freed, cleaned, and polished.

- D. Upon completion of the work, clean all equipment and piping installed under this Section and thoroughly wash and polish all plumbing fixtures, fittings, and trim, removing labels therefrom.

3.9 CHLORINATION

- A. Upon completion of all tests and necessary replacements, all domestic water piping shall be disinfected. Chlorination shall be accomplished by personnel in employ of a firm licensed to do this type of work. After the work has been accomplished, provide the **Owner** and **Architect** with a statement from the laboratory indicating the water is suitable for human consumption.
- B. The system shall be charged with a chlorine solution of at least 50 PPM residual chlorine. The solution shall be distributed evenly throughout the system until flowing out furthest outlets. The strong chlorine solution shall remain in the system for a minimum of 24 hours. The strength of the solution shall be confirmed at over 10 PPM at the end of the 24 hour period.
- C. Flush thoroughly and submit bacteriological samples to a certified laboratory which shall certify in writing that the water is suitable for drinking.

3.10 VALVE TAGS, PIPE TAGS, AND CHARTS

- A. See Section **200050**.

3.11 OPERATIONAL AND MAINTENANCE MANUAL

- A. Three (3) copies of operational and maintenance manuals are to be supplied to the **Architect**.

**** END OF SECTION ****

SECTION 230800
HEATING, VENTILATING AND AIR CONDITIONING

PART I - GENERAL

1.1 GENERAL

- A. The General Conditions, any Supplementary Conditions, Section 200050, *Mechanical General*, and Division 1 are hereby a part of this Section as fully as if repeated herein.

1.2 SCOPE

- A. Provide labor, material, equipment, and services to furnish and install complete heating, ventilating and air conditioning systems which shall include, but not necessarily be limited to equipment, ductwork, and temperature controls.
- B. Demolition: Remove existing equipment, ductwork, and related items in existing building and as indicated on Drawings.

1.3 SUBMITTALS

- A. Submit for review the required copies of a complete list of materials proposed for use, accompanied by manufacturer's data sheets giving sizes, capacities, etc. See General Conditions for requirements. Such list shall include the following:
1. Gas-fired Furnaces
 2. DX Coils
 3. Air Conditioners
 4. Exhaust Fans
 5. Filters
 6. Ductwork
 7. Insulation
 8. Dampers and sheet metal specialties
 9. Diffusers, registers, and grilles.
 10. Fire and fire/smoke dampers.
 11. Mechanical supports
 12. Balancing agency and protocol
 13. HVAC control system

- B. No substitute materials or equipment may be installed without the written approval of the **Architect**.
- C. All additional costs incurred by the substitution of material or equipment, or the installation thereof, whether architectural, structural, mechanical, electrical, or plumbing, shall be borne by the Contractor.
- D. For equipment specifically fabricated for this project, Shop Drawings and detailed description shall be submitted.

1.4 FINISH AND PAINTING

- A. See Division 099113 *Interior Painting* and 099123 *Exterior Painting*.
- B. Prime and paint diffuser boot and duct interiors where visible through grilles with a matte black finish.
- C. Prime and paint louver or grille interiors where required by **Architect**.
- D. Provide factory off-white finish as standard. Provide prime-painted grilles, registers and louvers where required by **Architect** for field painting under other Sections.

1.5 DEFINITIONS FOR "EXPOSED" AND "CONCEALED"

- A. Concealed: "Concealed" means hidden from sight in normally inaccessible areas such as trenches, chases, furred in spaces, areas above drop ceilings, crawl spaces, attic spaces, or pipe shafts.
- B. Exposed: "Exposed" means not "concealed", as defined previously. Exceptions to these definitions are specified. Service tunnels, mechanical equipment rooms, and storage areas; unfinished rooms are considered exposed.

PART II - PRODUCTS

2.1 HVAC EQUIPMENT

- A. See Schedules on Drawings for equipment data. Furnish and install all equipment in accordance with Drawings, manufacturer's recommendations and all applicable codes.

2.2 FILTERS

- A. Filter(s) shall be 1"-thick of size and number required for equipment and selected for initial resistance at 300 FPM velocity.
- B. Filter(s) shall be **disposable** type, Class 2 UL listed.
- C. Filter(s) shall be **minimum MERV 11** based on ASHRAE Standard 52.2 test method.

2.3 DUCTWORK

A. Duct Construction: Construction of ductwork shall be as follows:

1. Galvanized sheetmetal of thickness recommended in Table 1-4 of the latest edition of the SMACNA HVAC Duct Construction Standards, for 2" w.g., 2500 FPM maximum velocity, except no ducts shall be less than 24 gauge. Fabricate in accordance with SMACNA Standards except where otherwise specified or indicated.
2. Rectangular Ductwork: Groove and Pittsburgh lock seams and slip joints shall be used for all low pressure rectangular ducts. Contractor may use manufactured duct joint systems by Ductmate Industries, Ductmate "35" System for rectangular ducts, and Ductmate "Spiralmate" for round spiral sheetmetal duct. Provide duct joint systems where indicated on Drawings. Joint systems may be used on concealed ductwork at Contractor's option. Install per manufacturer's recommendations.

B. Flexible ducts shall conform to the following requirements:

1. Flexible ducts shall consist of an exterior reinforced laminated vapor barrier, 1 1/2" thick 3/4 lb density fiberglass insulation ($U=0.23$ at 50 F) encapsulated spring steel wire helix and impervious, smooth, non-perforated interior vinyl liner. Duct shall be rated for **2" w.g. (positive), 0.5" w.g. (negative)**, 4000 FPM velocity and 180F. Flame spread of not over 25, smoke developed of not over 50. Duct shall conform to requirements for Class I, UL 181, and NFPA 90A and 90B.

2.4 DUCT INSULATION AND LINING

A. Supply and return ductwork in directly conditioned space.

1. Duct insulation shall be Owens-Corning 1 1/2" type 100 FRK, Johns Manville 1 -1/2" thick Microlite XG type100 or approved equal, faced fiberglass ductwrap, $R=4.5$ at approximate installed thickness. Flame spread of not over 25, smoke developed of not over 50. Insulation shall conform to requirements for Class I, UL 181, and NFPA 90A and 90B.
2. Acoustic duct liner shall be Owens-Corning QuietR, AcousticR duct liner, type 200, $R=4.3$, 1" thick, Johns-Manville Linacoustic RC duct liner, 4-4.2, 1" thick or approved equal, average thermal conductivity of 0.23 per inch of thickness at 75°F mean temperature.

B. Supply and return ductwork in exterior and/or unconditioned space.

1. Duct insulation shall be Owens-Corning SoftR 3" type 75 FRK, Johns-Manville 3" Microlite XG type 100 or approved equal, faced fiberglass ductwrap, $R = 8.3$ at approximate installed thickness. Flame spread of not over 25, smoke developed of not over 50. Insulation shall conform to requirements for Class I, UL 181, and NFPA 90A and 90B.

2. Acoustic duct liner shall be Owens-Corning QuietR AcousticR acoustic duct liner board, R-8.0, 2" thick, unless otherwise indicated, average thermal conductivity of .23 per inch of thickness at 75F mean temperature.
- C. All duct insulation shall comply with Section 124, requirements for air distribution system ducts and plenums, 2008 Building Energy Efficiency Standards, California Code of Regulations, Title 24, Part 6.

2.5 DAMPERS AND SHEETMETAL SPECIALTIES

- A. Volume dampers shall be single blade dampers, job or factory fabricated of galvanized steel, two gauges heavier than duct and no longer than 12" x 48" reinforced or crimped for rigidity with pivot rod extending through duct. Positioning device shall be locking lever and quadrant.
- B. Flexible duct connectors at equipment shall be UL listed and provided with 24 gauge galvanized sheetmetal sun screen where exposed to weather.
- C. Volume extractors shall efficiently divert, equalize and control air flow from main ducts into take-off and remain aligned. Extractor shall have a series of radius vanes attached to pivoting frame and bracket, gang operated, with all vanes synchronized to move as a unit. Vanes shall be capable of being set from open (45°) to closed position. Extractors installed in duct take-offs 12" and smaller shall have maximum of 2" spacing for vanes. Blades shall be two gauges heavier than duct.
- D. Metal gauges, joints, bracings, duct supports and turning vanes shall conform to SMACNA HVAC Duct Construction Standards as minimum standard, and as specified and/or shown.
- E. Sheetmetal ductwork access doors shall be large enough for maintenance and equipment. Doors shall be factory fabricated with latches that can be easily opened without tools, hinges, and perimeter seals. Where insulation is required, door shall have insulation as an integral part. Construction and air tightness must be suitable for duct pressure class.

2.6 REGISTERS AND DIFFUSERS

- A. Registers and diffusers shall be as indicated on Drawings. Provide integral opposed blade dampers where indicated. Provide integral combination volume/fire damper at rated ceilings. Registers shall have adjustable air pattern for setting in field to match field conditions. Redirect air pattern when required or directed. Provide margins, leveling clips, plaster ground or frame as required for ceiling system in which diffuser or register is installed.

2.7 ROOF INLETS/OUTLETS

- A. Roof inlets/outlets shall be roof caps of size, type, and capacity noted on the Drawings. Roof cap housing shall be constructed of heavy gauge galvanized steel and shall be fully weatherproof and painted with name. Cap shall be reinforced to prevent oil canning and deflecting in high winds. Roof cap shall be complete

with **bird screen, exhaust cap**, and roof curb, as noted on Drawings. Distance of hood from roof shall be 18" unless otherwise noted on Drawings.

2.8 HVAC CONTROL SYSTEM

- A. A complete system shall be provided. System shall include components required to provide temperature and ventilation control for each zone.
- B. Provide required sequence of control (see Drawings).
- C. Furnish and install thermostats where indicated. Coordinate exact locations with **Architect**.
- D. Control system shall be complete and fully operational prior to system balancing.
- E. Wiring: Run in conduit and in accordance with Division 16 of these Specifications. All low voltage wiring required for HVAC controls shall be provided hereunder. See Section 200050, Mechanical General, and Division 16. All wiring shall be color coded and tagged in accordance with approved control diagrams.

PART III - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Equipment shall be installed level, on curbs or supports as required or indicated on Drawings and in accordance with manufacturer's recommendations.
- B. Equipment shall be installed in locations shown and as complete assemblies with service clearance required for access and maintenance.

3.2 DUCTWORK - INSTALLATION

- A. All ductwork of sheetmetal or fiberglass shall be in accordance with the applicable SMACNA manual, unless otherwise specified, airtight and supported as recommended. Ductwork shall run concealed unless otherwise noted.
- B. Erect all ductwork to dimensions indicated, straight and smooth on the inside with neatly finished joints lapped in direction of air travel. Properly brace and reinforce all ducts with steel angles or other members. All ductwork shall be of galvanized steel unless otherwise specified or indicated. Fabricate changes in direction, both horizontal and vertical, to permit easy air flow.
- C. Install ductwork to clear all obstructions, preserve headroom, and keep openings clear.
- D. Install supply ducts above return or exhaust ducts where possible; provide long straight duct drops to diffusers for proper diffuser performance or provide register boxes with turning vanes.

- E. Should it be found impractical to install any duct of the exact size given, a duct of a different shape but having the same air resistance shall be installed. These alternate duct sizes to be approved by the **Architect** prior to installation. Duct sizes given are inside dimensions inside the linings.
- F. All elbows 45° or greater shall be full elbows (centerline radius equal to duct width) or shall have turning vanes.
- G. Ends of ducts shall turn over 3/4" for airtight connections between ducts and grilles. The ducts and grilles shall have separate sets of screws. Register frames and ends of ducts shall be properly placed before finishing is begun.
- H. Provide volume extractors or volume dampers capable of adjustments and of being locked into position in take-offs. Provide suitable access through insulation for adjustment of extractors and dampers.
- I. All ducts shall be supported per SMACNA HVAC Duct Construction Standards for sheetmetal ducts and per SMACNA Seismic brace ductwork as indicated and per SMACNA manual.
- J. Vertical ducts shall be supported by extending bracing angles to rest firmly on floors or shall be bolted to walls, columns, or other construction.
- K. Fabricate compression type supports from cross-braced metal angles not smaller than that required for duct bracing.
- L. Duct Sealing:
 - 1. Ducts exposed to weather shall be completely weatherproof with outdoor vapor barrier mastic over tape at all joints and seams.
 - 2. Seal joints and seams of interior ductwork air tight.
 - 3. No "grey" duct tape shall be used. Metal duct sealing shall be "Aerobol", "hardcast", or SMACNA approved foil-backed pressure sensitive tape, except where otherwise indicated or specified.
 - 4. All duct sealing shall comply with section 124, requirements for air distribution system ducts and plenums, 2008 building energy efficiency standards, California Code of Regulations, Title 24, part G.

3.3 DUCT INSULATION AND LINING - INSTALLATION

- A. All concealed ductwork shall be insulated with fiberglass ductwrap unless otherwise specified.
- B. Any exposed ductwork in conditioned space shall have acoustic duct liner. Outside air and exhaust ducts shall not be insulated.
- C. All exposed ducts for conditioned air in non-conditioned space or outdoors shall be lined with acoustic duct liner.

- D. Rectangular ductwork may be lined with acoustic liner in lieu of exterior ductwrap. Provide acoustic lining where indicated on Drawings.
- E. Duct lining shall be installed according to manufacturer's application Specification with stick clips and adhesive and per the SMACNA Duct Liner Manual.
 - 1. Mechanical fasteners shall be flush with liner surface. All exposed edges and leading edges of all cross-joints of the liner shall be heavily coated with approved fire resistant adhesive. Duct liner shall be cut to assure snug closing corner joints; the black surface of the liner shall face the air stream; transverse joints shall be neatly butted; and any damaged areas shall be coated with a fire resistant approved adhesive.

3.4 FLEXIBLE DUCTWORK - INSTALLATION

- A. Flexible ductwork shall be installed with no runs more than 10'-0" and no more than three (3) bends of 45° maximum each. Flexible ductwork shall be used only at register connections. Provide 12" long by half circumference sheet metal saddles at each hanger.
- B. Flexible duct shall be installed in fully extended condition, free of sags and kinks, using only minimum length required to make connection. Bends greater than 90° are not allowed. Flexible duct shall be full size of branch. Any change of size to match terminal connection shall be made at terminal. Flexible duct shall be stretched out with bends of minimum two diameter radius of 90 degree bends. All connections to sheetmetal ducts shall be sealed with high pressure duct sealer and secured with 3/8" nylon straps around inside liner of flexible duct, as manufactured by Panduit or Tyton.
- C. Flexible ducts shall be supported at or near mid-length with 2" wide, 28 gauge steel hanger collar attached to the structure with an approved duct hanger. Installation shall minimize sharp radius turns or offsets. Flexible ducts properly installed may be used to cross seismic joints without offsets (CMC 1004[e]).

3.5 FLEXIBLE CONNECTORS - INSTALLATION

- A. Flexible connections shall be installed on inlet and outlet duct connections of fans, ventilating units and air conditioning units. Fabric shall be of weight and strength for service required, properly fitted to render connection air tight. Fabric of sufficient width to provide minimum space of 4" between connected items.

3.6 FIELD TESTS AND INSPECTIONS

- A. The Contractor is responsible for the administration and direction of tests. Furnish instruments, equipment, connective devices and personnel for the tests. Notify the **Architect** seven (7) days before inspection or testing is scheduled.
- B. The Mechanical Contractor shall procure the services of an **independent** air balance and testing agency, approved by the **Architect**, which specializes in the balancing and testing of heating and ventilating systems to balance, adjust, and

test air moving equipment, air distribution, and exhausting systems as herein specified. All work by this agency shall be done under direct supervision of a qualified test and balance engineer employed by them. Engineer/Agency shall be NEBB and/or AABC certified. All instruments used by this agency shall be accurately calibrated and maintained in good working order. If requested, the tests shall be conducted in the presence of the **Architect** and/or his/her representative or the **Owner's** representative.

- C. The Contractor shall submit, within 15 days after receipt of Contract, seven (7) copies of submittal data for testing and balancing of the heating and ventilating systems.
- D. The Balancing Contractor shall submit a balancing protocol to the **Architect** for approval. The protocol will detail testing methods and procedures, indicate sequence of testing, specify equipment to be used with model numbers, serial numbers, and calibration dates. A general procedure will not be accepted; procedure must be specific and address the requirements of the project.
- E. The Mechanical Contractor shall award the test and balance contract to the approved agency upon receipt of his/her Contract to allow the balancing agency to schedule this work in cooperation with trades involved and comply with the completion date.
- F. Test and balance agency shall include in its work allowance for the project a one year warranty, during which time the **Architect**, at his/her discretion, may request a recheck or resetting of any outlet, supply air fan or exhaust fan as listed in the test report. The agency shall provide technical personnel to assist the **Architect** in any tests he may require during this period of time.

NOTE: AFTER THE FINAL AIR BALANCE OF THE SYSTEM, REBALANCING MAY BE REQUIRED TO OBTAIN UNIFORM TEMPERATURE AS REQUIRED BY ACTUAL OCCUPANCY.

- G. Air balance performance and testing shall not begin until system has been completed and is in full working order. The Contractor shall put all heating, ventilating and air conditioning systems, and other equipment, in full operation and shall continue the operation of same during each working day of testing and balancing.

3.7 SPECIAL REQUIREMENTS

- A. The Balance Contractor shall review the project Drawings and become thoroughly familiar with the job site when the construction is in the early stages. During this review, all items discovered adversely affecting balancing or system performance shall be called to the attention of the **Architect**. Prior to any closing in of ductwork, verify that all fittings, dampers, control devices and test devices are properly located and installed. Submit report of this field visit to Contractor within 24 hr for review and comment by the **Architect**.
- B. Examine each air distribution system to see that it is free from obstructions. Determine that all dampers and registers are in the required setting; that

equipment is lubricated; and that the required filters are clean and functioning. Request that the Installing Contractor perform any adjustments necessary for proper functioning of the system.

- C. The Balance Contractor shall use test instruments that have been calibrated within a time period recommended by the manufacturer and have been checked for accuracy prior to the start of the testing, adjusting and balancing activity.
- D. Balance Contractor shall become familiar with and comply with the provisions of all national and local codes, ordinances and safety acts that affect the work.
- E. All diffusers, grilles and registers shall be adjusted to minimize drafts in all areas. Air distribution patterns shall be adjusted as per the Drawings.
- F. As a part of the work of this Contract, the Mechanical Contractor shall make any changes in the pulleys, belts and dampers, or the addition of dampers required for correct balance as recommended by the Balancing Agency, at no additional cost to the **Owner**.
- G. Duct Pressure Testing: Test all duct systems including supply, return and exhaust systems. System testing to include all supply ductwork from fan up to and including reheat coils, and return and exhaust ductwork from flexible runout connection to fan.
 - 1. Apply positive pressure to all systems being tested.
 - 2. Use a portable high-pressure blower and necessary instruments, and provide duct connections required for airflow and pressure testing.
 - 3. Conduct tests as indicated and as recommended in SMACNA balancing manual and to pressures indicated in SMACNA for duct construction and seal class recommendations.
 - 4. Test sections before they are concealed.
 - 5. Test for audible leaks, and repair. Retest after sealants have set.
 - 6. Test for air leakage. Repair as required.
 - 7. Mark all sections tested. Install certification sticker and initials of field test inspector.
 - 8. The allowed leakage is 5% of the total operating CFM of the system under test. If system is tested in segments, leakage is the summation of each section tested.

3.8 PERFORMANCE TESTING AND BALANCING

- A. Balancing and Testing of Air Systems: Adjust, balance and test air systems to achieve and confirm compliance with Drawings and Specifications. Prepare complete report of final test results and submit seven (7) copies to Contractor for forwarding to **Architect** for review and approval. Prior to submitting it to the

Architect, the Mechanical Contractor shall stamp and sign the cover page indicating he has reviewed the report and concurs with the findings. The report shall also be signed by the supervising test and balance engineer.

- B. Allowance shall be made for air filter resistance at the time of tests. The main air supplies shall be set with filter resistance midway between clean and dirty filters.

3.9 TESTING PROCEDURE

- A. The air balance agency shall perform the following tests and balance system in accordance with the following requirements:
 1. Test and adjust fan RPM to design requirement.
 2. Test and record motor amp draw and voltage; record and report all nameplate data for each fan.
 3. Make pitot tube traverse of main ducts and obtain design CFM at fans.
 4. Test and record each system's static pressures supply and return.
 5. Test and adjust each system within 5% of total design air CFM. Report final air quantities.
 6. Test and adjust system for design minimum CFM outside air, exhaust CFM. Report final air quantities.
 7. Test and record entering air temperature in heating and cooling modes.
 8. Test and record leaving air temperature in heating and cooling modes.
 9. Test and adjust each diffuser, grille, and register to within 10% of design requirements.
 10. Each grille, diffuser and register shall be identified as to location or area served.
 11. Size, type, and manufacturer of diffusers, grilles, registers, and all tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations.
 12. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM, and test resultant CFM after adjustment.
 13. In cooperation with the Control Contractor, adjust automatically operated dampers to operate as specified, indicated, and required. Testing agency shall check all controls for proper calibration and list all controls requiring adjustments by control installers.

14. Record setting of zone thermostats, record temperatures of each room after balancing is completed and indicate time and date of reading. Provide records in both heating and cooling modes.

3.10 ACCEPTANCE REQUIREMENTS

- A. Equipment and systems requiring certification for Code Compliance shall have Certificate of Acceptance completed and submitted to enforcement agency. See drawings for equipment and systems requiring acceptance certification.

3.11 INSTRUCTION BOOK - MAINTENANCE MANUALS

- A. The Contractor shall provide the **Owner** with three (3) copies of complete written instructions in the operation of the various systems. The instructions shall be bound in booklet form and shall include all pertinent operation and maintenance information on the equipment, with names of local suppliers and agents. The Contractor shall also instruct the **Owner** or his/her representatives in the operation of the system. The instructions shall reference all equipment numbers. See Section 200050, Mechanical General for additional requirements.

**** END OF SECTION ****

SECTION 260500 – GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations that are shown on the Drawings, included in these specifications, or otherwise needed for a complete and fully operating facility.
- B. Furnish and install all required in-place equipment, conduits, conductors, cables and any miscellaneous materials for the satisfactory interconnection and operation of all associated electrical systems.

1.2 RELATED WORK

- A. This Section provides the basic Electrical Requirements which supplement the General Requirements of Division 01 and apply to all Sections of Division 26.

1.3 SUBMITTALS

- A. As specified in Division 01. Submit to the Architect shop drawings, manufacturer's data and certificates for equipment, materials and finish, and pertinent details for each system specified. Information to be submitted includes manufacturer's descriptive literature of cataloged products, equipment, drawings, diagrams, performance and characteristic curves as applicable, test data and catalog cuts. Obtain written approval before procurement, fabrication, or delivery of the items to the job site. Partial submittals are not acceptable and will be returned without review. Furnish manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Industry and Technical Society Publication References, and years of satisfactory service of each item required to establish contract compliance. Photographs of existing installations and data submitted in lieu of catalog data are not acceptable and will be returned without approval.
- B. Organize submittals for equipment and items related to each specification section together as a package.
- C. Proposed substitutions of products will not be reviewed or approved prior to awarding of the Contract.
- D. Substitutions shall be proven to the Architect or Engineer to be equal or superior to the specified product. Architect's decision is final. The Contractor shall pay all costs incurred by the Architect and Engineer in reviewing and processing any proposed substitutions whether or not a proposed substitution is accepted.
- E. If a proposed substitution is rejected, the contractor shall furnish the specified product at no increase in contract price.

- F. If a proposed substitution is accepted, the contractor shall be completely responsible for all dimensional changes, electrical changes, or changes to other work which are a result of the substitution. The accepted substitution shall be made at no additional cost to the owner or design consultants.

1.4 QUALITY ASSURANCE

- A. Codes: All electrical equipment and materials, including installation and testing, shall conform to the latest editions following applicable codes:
 - 1. California Electrical Code (CEC).
 - 2. Occupational Safety and Health Act (OSHA) standards.
 - 3. All applicable local codes, rules and regulations.
 - 4. Electrical Contractor shall possess a C-10 license and all other licenses as may be required. Licenses shall be in effect at start of this contract and be maintained throughout the duration of this contract.
- B. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply.
- C. Standards: Equipment shall conform to applicable standards of American National Standards Institute (ANSI), Electronics Industries Association (EIA), Institute of Electrical and Electronics Engineers (IEEE), and National Electrical Manufacturers Association (NEMA).
- D. Underwriter Laboratories (UL) listing is required for all equipment and materials where such listing is offered by the Underwriters Laboratories. Provide service entrance labels for all equipment required by the NEC to have such labels.
- E. The electrical contractor shall guarantee all work and materials installed under this contract for a period of one (1) year from date of acceptance by owner.
- F. All work and materials covered by this specification shall be subject to inspection at any and all times by representatives of the owner. Work shall not be closed in or covered before inspection and approval by the owner or his representative. Any material found not conforming with these specifications shall, within 3 days after being notified by the owner, be removed from premises; if said material has been installed, entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the contractor.

1.5 CONTRACT DOCUMENTS

- A. Drawings and Specifications:
 - 1. In the case of conflict between the drawings and specifications, the specifications shall take precedence.

2. Drawings and specifications are intended to comply with all law, ordinances, rules and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, said laws, ordinance, rules and regulations shall be considered as a part of said Contract Documents within the limits specified. The Contractor shall bear all expenses of correcting work done contrary to said laws, ordinance, rules and regulations if the Contractor knew or should have known that the work as performed is contrary to said laws, ordinances, rules and regulations and if the Contractor performed same (1) without first consulting the Architect for further instructions regarding said work and/or (2) disregarded the Architect's instructions regarding said work.

B. Drawings: The Electrical Drawings shall govern the general layout of the completed construction.

1. Locations of equipment, panels, pullboxes, conduits, stub-ups, ground connections are approximate unless dimensioned; verify locations with the Architect prior to installation.
2. Review the Drawings and Specification Divisions of other trades and perform the electrical work that will be required for those installations.
3. Should there be a need to deviate from the Electrical Drawings and Specifications, submit written details and reasons for all changes to the Architect for approval.
4. The general arrangement and location of existing conduits, piping, apparatus, etc., is approximate. The drawings and specifications are for the assistance and guidance of the contractor, exact locations, distances and elevations are governed by actual field conditions. Accuracy of data given herein and on the drawings is not guaranteed. Minor changes may be necessary to accommodate work. The contractor is responsible for verifying existing conditions. Should it be necessary to deviate from the design due to interference with existing conditions or work in progress, claims for additional compensation shall be limited to those for work required by unforeseen conditions as determined by the Architect.
5. All drawings and divisions of these specifications shall be considered as whole. The contractor shall report any apparent discrepancies to the Architect prior to submitting bids.
6. The contractor shall be held responsible to have examined the site and compared it with the specifications and plans and to have satisfied himself as to the conditions under which the work is to be performed. He shall be held responsible for knowledge of all existing conditions whether or not accurately described. No subsequent allowance shall be made for any extra expense due to failure to make such examination.

1.6 CLOSEOUT SUBMITTALS

- A. Manuals: Furnish manuals for equipment where manuals are specified in the equipment specifications or are specified in Division 01.

1.7 COORDINATION

- A. Coordinate the electrical work with the other trades, code authorities, utilities and the Architect.

- B. Provide and install all trenching, backfilling, conduit, pull boxes, splice boxes, etc. for all trenching required on drawings.
- C. Contractor shall pay all inspection and other applicable fees and procure all permits necessary for the completion of this work.
- D. Where connections must be made to existing installations, properly schedule all the required work, including the power shutdown periods.
- E. When two trades join together in an area, make certain that no electrical work is omitted.

1.8 JOB CONDITIONS

- A. Operations: Perform all work in compliance with Division 01.
 - 1. Keep the number and duration of power shutdown periods to a minimum.
 - 2. Show all proposed shutdowns and their expected duration on the construction schedule. Schedule and carry out shutdowns so as to cause the least disruption to operation of the Owner's facilities.
 - 3. Carry out shutdown only after the schedule has been approved, in writing, by the owner. Submit power interruption schedule 15 days prior to date of interruption.
- B. Construction Power: Unless otherwise noted in Division 01 of these specifications, contractor shall make all arrangements and provide all necessary facilities for temporary construction power from the owner's on site source. Energy costs shall be paid for by the Owner.
- C. Storage: Provide adequate storage for all equipment and materials which will become part of the completed facility so that it is protected from weather, dust, water, or construction operations.

1.9 DAMAGED PRODUCTS

- A. Notify the Architect in writing in the event that any equipment or material is damaged. Obtain approval from the Architect before making repairs to damaged products.

1.10 LOCATIONS

- A. General: Use equipment, materials and wiring methods suitable for the types of locations in which they are located.
- B. Dry Locations: All those indoor areas which do not fall within the definition below for Wet Locations and which are not otherwise designated on the Drawings.
- C. Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the Drawings.

1.11 SAFETY AND INDEMNITY

- A. The Contractor is solely and completely responsible for conditions of the job site including safety of all persons and property during performance of the work. This requirement will apply continually and not be limited to normal working hours. The contractor shall provide and maintain throughout the work site proper safeguards including, but not limited to, enclosures, barriers, warning signs, lights, etc. to prevent accidental injury to people or damage to property.
- B. No act, service, drawing review or construction review by the Owner, the Engineer or their Consultants is intended to include reviews of the adequacy of the Contractors safety measures in or near the construction site.
- C. The Contractor performing work under this Division of the Specifications shall hold harmless, indemnify, and defend the Owner, the Engineer, their consultants, and each of their officers, agents and employees from any and all liability claims, losses, or damage arising out of or alleged to arise from bodily injury, sickness, or death of a person or persons and for all damages arising out of injury to or destruction of property arising directly or indirectly out of or in connection with the performance of the work under this Division of the Specifications, and from the Contractor's negligence in the performance of the work described in the construction contract documents, but not including liability that may be due to the sole negligence of the Owner, the Engineer, their Consultants or their officers, agents and employees.
- D. If a work area is encountered that contains hazardous materials, the contractor is advised to coordinate with the owner and it's abatement consultant for abatement of hazardous material by the Owner's Representative. "Hazardous materials" means any toxic substance regulated or controlled by OSHA, EPA, State of California or local rules, regulations and laws. Nothing herein shall be construed to create a liability for Aurum Consulting Engineers regarding hazardous materials abatement measures, or discovery of hazardous materials.

1.12 ACCESS DOORS

- A. The contractor shall install access panels as required where floors, walls or ceilings must be penetrated for access to electrical, control, fire alarm or other specified electrical devices. The minimum size panel shall be 14" x 14" in usable opening. Where access by a service person is required, minimum usable opening shall be 18" x 24".
- B. All access doors installed lower than 7'-0" above finished floor and exposed to public access shall have keyed locks.
- C. Where specific information or details relating to access panels differ from Division 26 paragraph 1.12 of these specifications, or shown on the electrical drawings and details or under other Divisions of work, those requirements shall supersede these specifications.

1.13 ARC FLASH

- A. The contractor shall install a clearly visible arc flash warning to the inside door of all panelboards and industrial control panels, as well as to the front of all switchboards and motor control centers that are a part of this project.

- B. The warning shall have the following wording: line 1 “WARNING” (in large letters), line 2 “Potential Arc Flash Hazard” (in medium letters), line 3 & 4 “Appropriate Personal Protective Equipment and Tools required when working on this equipment”.

PART 2 - PRODUCTS

2.1 STANDARD OF QUALITY

- A. Products that are specified by manufacturer, trade name or catalog number establish a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are established to be equal to the specified product and approved by the Architect prior to installation.
- B. Material and Equipment: Provide materials and equipment that are new and are current products of manufacturers regularly engaged in the production of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period includes use of equipment and materials of similar size under similar circumstances. For uniformity, only one manufacturer will be accepted for each type of product.
- C. Service Support: Submit a certified list of qualified permanent service organizations including their addresses and qualification for support of the equipment. These service organizations shall be convenient to the equipment installation and able to render service to the equipment on a regular and emergency basis during the warranty period of the contract.
- D. Manufacturer's Recommendations: Where installation procedures are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendation shall be cause for rejection of the equipment or material.

2.2 NAMEPLATES

- A. For each piece of electrical equipment, provide a manufacturer's nameplate showing his name, location, the pertinent ratings, the model designation, and shop order number.
- B. Identify each piece of equipment and related controls with a rigid laminated engraved plastic nameplate. Unless otherwise noted, nameplates shall be melamine plastic 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 0.5 by 2.5 inches unless otherwise noted. Where not otherwise specified, lettering shall be a minimum of 0.25 inch high normal block style. Engrave nameplates with the inscriptions indicated on the Drawings and, if not so indicated, with the equipment name. Securely fasten nameplates in place using two stainless steel or brass screws.

2.3 FASTENERS

- A. Fasteners for securing equipment to walls, floors and the like shall be either hot-dip galvanized after fabrication or stainless steel.

2.4 FINISH REQUIREMENTS

- A. Equipment: Refer to each electrical equipment section of these Specifications for painting requirements of equipment enclosures. Repair any final paint finish which has been damaged or is otherwise unsatisfactory, to the satisfaction of the Architect.
- B. Wiring System: In finished areas, paint all exposed conduits, boxes and fittings to match the color of the surface to which they are affixed.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. Ensure that all equipment and materials fit properly in their installation.
- B. Perform any required work to correct improperly fit installation at no additional expense to the owner.
- C. All electrical equipment and materials shall be installed in a neat and workmanship manner in accordance with the "NECA-1 Standard Practices for Good Workmanship in Electrical Contracting". Workmanship of the entire job shall be first class in every respect.

3.2 EQUIPMENT INSTALLATIONS

- A. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.
- B. Do all the cutting and patching necessary for the proper installation of work and repair any damage done.
- C. Earthquake restraints: all electrical equipment, including conduits over 2 inches in diameter, shall be braced or anchored to resist a horizontal force acting in any direction as per Title 24, part 2, table 16a-o, part 3.
- D. Structural work: All core drilling, bolt anchor insertion, or cutting of existing structural concrete shall be approved by a California registered structural consulting engineer prior to the execution of any construction. At all floor slabs and structural concrete walls to be drilled, cut or bolt anchors inserted, the contractor shall find and mark all reinforcing in both faces located by means of x-ray, pach-ometer, or prof-ometer. Submit sketch showing location of rebar and proposed cuts, cores, or bolt anchor locations for approval.

3.3 FIELD TEST

- A. Test shall be in accordance with Acceptance testing specifications issued by the National Electrical Testing Association (NETA).
- B. Perform equipment field tests and adjustments. Properly calibrate, adjust and operationally check all circuits and components, and demonstrate as ready for service. Make additional calibration and adjustments if it is determined later that the initial adjustments are not satisfactory for proper performance. Perform equipment field test for equipment where equipment field tests are specified in the equipment Specifications. Give sufficient notice to the Architect prior to any test so that the tests may be witnessed.
- C. Provide instruments, other equipment and material required for the tests. These shall be of the type designed for the type of tests to be performed. Test instrument shall be calibrated by a recognized testing laboratory within three months prior to performing tests.
- D. Operational Tests: Operationally test all circuits to demonstrate that the circuits and equipment have been properly installed and adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, including alarm conditions.
- E. Re-testing will be required for all unsatisfactory tests after the equipment or system has been repaired. Re-test all related equipment and systems if required by the Architect. Repair and re-test equipment and systems which have been satisfactorily tested but later fail, until satisfactory performance is obtained.
- F. Maintain records of each test and submit five copies to the Architect when testing is complete. All tests shall be witnessed by the Architect. These records shall include:
 - 1. Name of equipment tested.
 - 2. Date of report.
 - 3. Date of test.
 - 4. Description of test setup.
 - 5. Identification and rating of test equipment.
 - 6. Test results and data.
 - 7. Name of person performing test.
 - 8. Owner or Architect's initials.
- G. Items requiring testing shall be as noted in the additional electrical sections of these specifications.

3.4 CLEANING EQUIPMENT

- A. Thoroughly clean all soiled surfaces of installed equipment and materials.

3.5 PAINTING OF EQUIPMENT

- A. Factory Applied: Electrical equipment shall have factory applied painting system which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical section.
- B. Field Applied: Paint electrical equipment as required to match finish of adjacent surfaces.

3.6 RECORDS

- A. Maintain one copy of the contract Drawing Sheets on the site of the work for recording the "as built" condition. After completion of the work, the Contractor shall carefully mark the work as actually constructed, revising, deleting and adding to the Drawing Sheets as required. The following requirements shall be complied with:
 - 1. Cable Size and Type: Provide the size and type of each cable installed on project.
 - 2. Substructure: Where the location of all underground conduits, pull boxes, stub ups and etc. where are found to different than shown, carefully mark the correct location on the Drawings. Work shall be dimensioned from existing improvements.
 - 3. Size of all conduit runs.
 - 4. Routes of concealed conduit runs and conduit runs below grade.
 - 5. Homerun points of all branch circuit.
 - 6. Location of all switchgear, panels, MCC, lighting control panels, pullcans, etc.
 - 7. Changes made as a result of all approved change orders, addendums, or field authorized revisions.
 - 8. As Builts: At the completion of the Work the Contractor shall review, certify, correct and turn over the marked up Drawings to the Architect for his use in preparing "as built" plans.
 - 9. As built Drawings shall be delivered to the Architect within ten (10) days of completion of construction.

3.7 CLEAN UP

- A. Upon completion of electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean, and acceptable to the Architect.

3.8 MECHANICAL AND PLUMBING ELECTRICAL WORK

- A. The requirements for electrical power and/or devices for all mechanical and plumbing equipment supplied and/or installed under this Contract shall be coordinated and verified with the following:
 - 1. Mechanical and Plumbing Drawings.
 - 2. Mechanical and Plumbing sections of these Specifications.
 - 3. Manufacturers of the Mechanical and Plumbing equipment supplied.
- B. The coordination and verification shall include the voltage, ampacity, phase, location and type of disconnect, control, and connection required. Any changes that are required as a result of this coordination and verification shall be a part of this Contract.
- C. The Electrical Contractor shall furnish and install the following for all mechanical and plumbing equipment:
 - 1. Line voltage conduit and wiring.
 - 2. Disconnect switches.
 - 3. Manual line motor starters.
- D. Automatic line voltage controls and magnetic starters shall be furnished by the Mechanical and/or Plumbing Contractor and installed and connected by the Electrical Contractor. When subcontracted for by the Mechanical and/or Plumbing Contractor, all line voltage control wiring installed by the Electrical Contractor shall be done per directions from the Mechanical and/or Plumbing Contractor.
- E. All low voltage control wiring for Mechanical and Plumbing equipment shall be installed in conduit. Furnishing, installation and connection of all low voltage conduit, boxes, wiring and controls shall be by the Mechanical and/or Plumbing Contractor.
- F. Disconnects (Motor And Circuit)
 - 1. Disconnect switches shall be as manufactured by ITE- Siemens, General Electric or Square D.
- G. Disconnects (Motor: Fused):
 - 1. Disconnect switches shall be provided and located at all motors.
 - 2. Switches for three-phase motors shall be heavy-duty, horsepower rated three-pole, and surface mounted except as noted on drawings.
 - 3. Switches containing more than three poles shall be as specified on the drawings.
 - 4. Switches for single-phase, fractional horsepower motors shall be heavy-duty, horsepower rated.
 - 5. Switches shall be horsepower rated.

END OF SECTION 260500

SECTION 260519 – LINE VOLTAGE WIRE AND CABLE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The work of this Section consists of providing all wire and cable rated 600 volts or less, including splices and terminations, as shown on the Drawings and as described herein.

1.2 RELATED WORK

- A. See the following Specification Section for work related to the work in this Section:
 - 1. 260542 Conduits, Raceways and Fittings.
 - 2. 260533 Junction and Pull Boxes.

1.3 QUALITY ASSURANCE

- A. Field tests shall be performed as specified in paragraph 3.04 of this Section.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Conductors shall be copper, type THHN/THWN/MTW oil and gasoline resistant, 600 volt rated insulation.
- B. Conductors shall be stranded copper.
- C. Minimum power and control wire size shall be No. 12 AWG unless otherwise noted.
- D. All conductors used on this Project shall be of the same type and conductor material.

2.2 CABLES

- A. All individual conductors shall be copper with type THHN/THWN, 600 volt rated insulation.
- B. Insulation Marking - All insulated conductors shall be identified with printing colored to contrast with the insulation color.
- C. Color Coding - As specified in paragraph 3.3.

- D. Special Wiring - Where special wiring is proposed by an equipment manufacturer, submit the special wiring requirements to the Owner's Representative and, if approved, provide same. Special wire shall be the type required by the equipment manufacturer.
- E. Other Wiring - Wire or cable not specifically shown on the Drawings or specified, but required, shall be of the type and size required for the application and as approved by the Owner's Representative.
- F. Manufacturer - Acceptable manufacturers including Cablec, Southwire, or equal.

2.3 TERMINATIONS

- A. Manufacturer - Terminals as manufactured by T&B, Burndy or equal.
- B. Wire Terminations – Stranded conductors shall be terminated in clamping type terminations which serve to contain all the strands of the conductor. Curling of a stranded conductor around a screw type terminal is not allowed. For screw type terminations, use a fork type stake-on termination on the stranded conductor. Use only a stake-on tool approved for the fork terminals selected.
- C. End Seals - Heat shrink plastic caps of proper size for the wire on which used.

2.4 TAPE

- A. Tape used for terminations and cable marking shall be compatible with the insulation and jacket of the cable and shall be of plastic material.

PART 3 - EXECUTION

3.1 CABLE INSTALLATION

- A. Clean Raceways - Clean all raceways prior to installation of cables as specified in Section 260542 - Conduits Raceway and Fittings.
- B. All line voltage wiring shall be installed in conduit.
- C. All feeder conductors shall be continuous from equipment to equipment. Splices in feeders are not permitted unless specifically noted or approved by the Electrical Engineer.
- D. All branch circuit wiring shall be run concealed in ceiling spaces, walls, below floors or in crawl spaces unless noted otherwise.
- E. Cable Pulling - Exercise care in pulling wires and cables into conduit or wireways so as to avoid kinking, putting undue stress on the cables or otherwise abrading them. No grease will be permitted in pulling cables. Only soapstone, talc, or UL listed pulling compound will be permitted. The raceway construction shall be complete and protected from the weather before

cable is pulled into it. Swab conduits before installing cables and exercise care in pulling, to avoid damage to conductors.

- F. Bending Radius - Cable bending radius shall be per applicable code. Install feeder cables in one continuous length.
- G. Equipment Grounding Conductors - Provide an equipment grounding conductor, whether or not it is shown on the Drawings, in all conduits or all raceways.
- H. Panelboard Wiring - In panels, bundle incoming wire and cables which are No. 6 AWG and smaller, lace at intervals not greater than 6 inches, neatly spread into trees and connect to their respective terminals. Allow sufficient slack in cables for alterations in terminal connections. Perform lacing with plastic cable ties or linen lacing twine. Where plastic panel wiring duct is provided for cable runs, lacing is not necessary when the cable is properly installed in the duct.

3.2 CABLE TERMINATIONS AND SPLICES

- A. Splices - UL Listed wirenuts.
- B. Terminations - Shall comply with the following:
 1. Make up and form cable and orient terminals to minimize cable strain and stress on device being terminated on.
 2. Burnish oxide from conductor prior to inserting in oxide breaking compound filled terminal.

3.3 CIRCUIT AND CONDUCTOR IDENTIFICATION

- A. Color Coding - Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. Conductor colors shall be as follows:

<u>VOLTAGE</u>	<u>240/120V</u>
Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Ground	Green

- B. Color coding shall be in the conductor insulation for all conductors #10 AWG and smaller; for larger conductors, color shall be either in the insulation or in colored plastic tape applied at every location where the conductor is readily accessible.
- C. Circuit Identification - All underground distribution and service circuits shall be provided with plastic identification tags in each secondary box and at each termination. Tags shall identify the source transformer of the circuit and the building number(s) serviced by the circuit.

3.4 FIELD TESTS

- A. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and ground of not less than the requirements of the CEC. All circuits shall be tested for proper neutral connections.
- B. Insulation Resistance Tests: Perform insulation resistance tests on circuits with #2 AWG and larger conductors to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests before all equipment has been connected. Test the insulation with a 500Vdc insulation resistance tester with a scale reading 100 mega ohms. The insulation resistance shall be 2 mega ohms or more. Submit results for review.

END OF SECTION 260519

SECTION 260526 – GROUNDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Conduits, wires, ground rods and other materials for the electrical grounding system.

1.2 RELATED SECTIONS

- A. Section 260500 - Electrical General Requirements.

PART 2 - PRODUCTS

2.1 GROUND ROD

- A. "Copperweld" ground rod conforming to or exceeding requirements of U.L. Specification No. 467 (ANSI C-33.8). Rod shall be 3/4" diameter and 10' in length, unless otherwise noted on the Drawings.

2.2 BELOW GRADE CONNECTIONS

- A. Compression fittings, Thomas & Betts, Series 52000, 53000 or 54000 or approved equal.

2.3 HARDWARE

- A. Bolts, nuts and washers shall be bronze, cadmium plated steel or other non-corrosive materials, approved for the purpose.

2.4 WATERPROOF SEALANT

- A. Use Kearney "Aqua Seal" mastic sealant on all below grade clamp or compression type connections.

PART 3 - EXECUTION

3.1 GROUNDING AND BONDING

- A. Grounding and bonding shall be as required by codes and local authorities.
- B. All electrical equipment shall be grounded, including, but not limited to, panel boards, terminal cabinets and outlet boxes.

- C. The ground pole of receptacles shall be connected to their outlet boxes by means of a copper ground wire connecting to a screw in the back of the box.
- D. A green insulated copper ground wire, sized to comply with codes, shall be installed in all conduit runs.
- E. All metal parts of pull boxes shall be grounded per code requirements.
- F. All ground conductors shall be green insulated copper.
- G. The ground system electrodes shall be tested for resistance before the equipment ground conductors are connected. Maximum ground system resistance shall be 25 ohms. Install up to two additional ground rods to meet the 25 ohm requirement. Multiple ground rods shall not be less than 10 feet apart.
- H. Grounding of the panels and buildings shall be completed as indicated on the Drawings.

END OF SECTION 260526

SECTION 260533 – OUTLET, JUNCTION AND PULL BOXES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations shown on the drawings, included in these Specification, or otherwise needed for a complete and fully operating facility. The work shall include but not be limited to the following:
- B. Furnish and install all required material, supports and miscellaneous material for the satisfactory interconnection of all associated electrical systems.

1.2 RELATED WORK:

- A. See the following specification sections for work related to the work of this section.
 - 1. 260500 General Electrical Requirements.
 - 2. 260542 Conduits, Raceway and Fittings.
 - 3. 260519 Line Voltage Wire and Cable.

PART 2 - PRODUCTS

2.1 OUTLET BOXES, JUNCTION AND PULL BOXES

- A. Standard Outlet Boxes: Galvanized, steel, knock-out type of size and configuration best suited to the application indicated on the Drawings. Minimum box size shall be 4 inches square (octagon for most light fixtures) by 1-1/2 inches deep with mud rings as required.
- B. Switch boxes: Minimum box size shall be 4 inches square by 1-1/2 inches deep with mud rings as required. Install multiple switches in standard gang boxes with raised device covers suitable for the application indicated.
- C. Conduit bodies: Cadmium plated, cast iron alloy. Conduit bodies with threaded conduit hubs and neoprene gasketed, cast iron covers. Bodies shall be used to facilitate pulling of conductors or to make changes in conduit direction only. Splices are not permitted in conduit bodies. Crouse-Hinds Form 8 Condulets, Appleton Form 35 Unilets or equal.
- D. Sheet Metal Boxes: Use standard outlet or concrete ring boxes wherever possible; otherwise use a minimum 16 gauge galvanized sheet metal, NEMA I box sized to Code requirements with covers secured by cadmium plated machine screws located six inches on centers. Circle AW Products, Hoffman Engineering Company or equal.

- E. Flush Mounted Pull boxes and Junction boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

PART 3 - EXECUTION

3.1 OUTLET BOXES

A. General:

1. All outlet boxes shall finish flush with building walls, ceilings and floors except in mechanical and electrical rooms above accessible ceiling or where exposed work is called for on the Drawings.
2. Install raised device covers (plaster rings) on all switch and receptacle outlet boxes installed in masonry or stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.
3. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

B. Box Layout:

1. Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.
2. Locate switch outlet boxes on the latch side of doorways.
3. Outlet boxes shall not be installed back to back nor shall through-wall boxes be permitted. Outlet boxes on opposite sides of a common wall shall be separated horizontally by at least one stud or vertical structural member.
4. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.
5. On fire rated walls, the total face area of the outlet boxes shall not exceed 100 square inches per 100 square feet of wall area.

C. Supports:

1. Outlet Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.
2. Fixture outlet boxes installed in suspended ceiling of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.
3. Fixture outlet boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above where pendant mounted lighting fixture are to be installed on the box.

4. Fixture Boxes above tile ceilings having exposed suspension systems shall be supported directly from the structure above.
5. Outlet and / or junction boxes shall not be supported by grid or fixture hanger wires at any locations.

3.2 JUNCTION AND PULL BOXES

A. General:

1. Install junction or pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.
2. Locate pull boxes and junction boxes in concealed locations above accessible ceilings or exposed in electrical rooms, utility rooms or storage areas.
3. Install raised covers (plaster rings) on boxes in stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.
4. Leave no unused openings in any box. Install close-up plugs as required to seal openings.
5. Identify circuit numbers and panel on cover of junction box with black marker pen.

B. Box Layouts:

1. Boxes above hung ceilings having concealed suspension systems shall be located adjacent to openings for removable recessed lighting fixtures.

C. Supports:

1. Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.
2. Boxes installed in suspended ceilings of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.
3. Boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above.
4. Boxes mounted above suspended acoustical tile ceilings having exposed suspension systems shall be supported directly from the structure above.

END OF SECTION 260533

SECTION 260542 – CONDUITS, RACEWAYS AND FITTINGS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The work of this section consists of furnishing and installing conduits, raceways and fittings as shown on the Drawings and as described herein.

1.2 RELATED WORK

- A. See the following specification sections for work related to the work in this section:
 - 1. 260543 Underground Ducts
 - 2. 260519 Line Voltage Wire and Cable
 - 4. 260533 Junction and Pull Boxes

PART 2 – PRODUCTS

2.1 CONDUITS, RACEWAYS

- A. Electrical Metallic Tubing (EMT) shall be hot-dip galvanized after fabrication. Couplings shall be compression or set-screw type.
- B. Flexible Conduit: Flexible metal conduit shall be galvanized steel.
- C. Galvanized Rigid Steel Conduit (GRS) shall be hot-dip galvanized after fabrication. Couplings shall be threaded type.
- D. Rigid Non-metallic Conduit: Rigid non-metallic conduit shall be PVC Schedule 40 (PVC-40 or NEMA Type EPC-40) conduit approved for underground use and for use with 90° C wires.

2.2 CONDUIT SUPPORTS

- A. Supports for individual conduits shall be galvanized malleable iron one-hole type with conduit back spacer.
- B. Supports for multiple conduits shall be hot-dipped galvanized Unistrut or Superstrut channels, or approved equal. All associated hardware shall be hot-dip galvanized.
- C. Supports for EMT conduits shall be galvanized pressed steel single hole straps.
- D. Clamp fasteners shall be by wedge anchors. Shot in anchors shall not be allowed.

2.3 FITTINGS

- A. Provide threaded-type couplings and connectors for rigid steel conduits; provide steel compression (watertight), or steel set-screw type for EMT, (die-cast zinc or malleable iron type fittings are not allowed). Provide threaded couplings and Meyers hubs for rigid steel conduit exposed to weather.
- B. Fittings for flexible conduit shall be Appleton, Chicago, IL, Type ST, O-Z Gedney Series 4Q by General Signal Corp., Terryville, CT, T & B 5300 series, or approved equal.
- C. Fittings for use with rigid steel shall be galvanized steel or galvanized cast ferrous metal; access fittings shall have gasketed cast covers and be Crouse Hinds Condulets, Syracuse, NY, Appleton Unilets, Chicago, IL, or approved equal. Provide threaded-type couplings and connectors; set-screw type and compression-type are not acceptable.
- D. Fittings for use with rigid non-metallic conduit shall be PVC and have solvent-weld-type conduit connections.
- E. Union couplings for conduits shall be the Erickson type and shall be Appleton, Chicago, IL, Type EC, O-Z Gedney 3-piece Series 4 by General Signal Corp., Terryville, CT, or approved equal. Threadless coupling shall not be used.
- F. Bushings:
 - 1. Bushings shall be the insulated type.
 - 2. Bushings for rigid steel shall be insulated grounding type, O-Z Gedney Type HBLG, Appleton Type GIB, or approved equal.
- G. Conduit Sealants:
 - 1. Fire Retardant Types: Fire stop material shall be reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL Classification 35L4 or as specified on the Drawings.

PART 3 - EXECUTION

3.1 CONDUIT, RACEWAY AND FITTING INSTALLATION:

- A. For conduit runs exposed to weather provide rigid metal (GRS).
- B. For conduit run underground, in concrete or masonry block wall and under concrete slabs, install minimum ¾" size nonmetallic (PVC) with PVC elbows. Where conduits transition from underground or under slab to above grade install wrapped rigid metal (GRS) elbows and risers.
- C. For conduit runs concealed in steel or wood framed walls or in ceiling spaces or exposed in interior spaces above six feet over the finished floor, install EMT.

- D. Flexible metal conduit shall be used only for the connection of recessed lighting fixtures and motor connections unless otherwise noted on the Drawings. Liquid-tight steel flexible conduit shall be used for motor connections.
- E. The minimum size raceway shall be 1/2-inch unless indicated otherwise on the Drawings.
- F. Installation shall comply with the CEC.
- G. From pull point to pull point, the sum of the angles of all of the bends and offset shall not exceed 360 degrees.
- H. Conduit Supports: Properly support all conduits as required by the NEC. Run all conduits concealed except where otherwise shown on the drawings.
 - 1. Exposed Conduits: Support exposed conduits within three feet of any equipment or device and at intervals not exceeding NEC requirements; wherever possible, group conduits together and support on common supports. Support exposed conduits fastened to the surface of the concrete structure by one-hole clamps, or with channels. Use conduit spacers with one-hole clamps.
 - a. Conduits attached to walls or columns shall be as unobtrusive as possible and shall avoid windows. Run all exposed conduits parallel or at right angles to building lines.
 - b. Group exposed conduits together. Arrange such conduits uniformly and neatly.
 - 2. Support all conduits within three feet of any junction box, coupling, bend or fixture.
 - 3. Support conduit risers in shafts with Unistrut Superstrut, or approved equal, channels and straps.
- I. Moisture Seals: Provide in accordance with NEC paragraphs 230-8 and 300-5(g).
- J. Where PVC conduit transitions from underground to above grade, provide rigid steel 90's with risers. Rigid steel shall be half-lap wrapped with 20 mil tape and extend minimum 12" above grade.
- K. Provide a nylon pull cord in each empty raceway.
- L. Provide galvanized rigid steel factory fittings for galvanized rigid steel conduit.
- M. Slope all underground raceways to provide drainage; for example, slope conduit from equipment located inside a building to the pull box or manhole located outside the building.
- N. Conduits shall be blown out and swabbed prior to pulling wires, or installation of pull cord in empty conduits.

END OF SECTION 260542

SECTION 262416 - PANELBOARDS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. The work of this Section consists of providing panelboards and circuit breakers as shown on the Drawings and as described herein.

1.2 RELATED WORK

- A. See the following specification sections for work related to the work in this Section.
 - 1. 260519 Line Voltage Wire and Cable
 - 2. 260526 Grounding
 - 3. 262816 Circuit Breakers

1.3 SUBMITTALS

- A. Shop Drawings - As specified in Division 01 and Section 260500. For each panelboard and distribution panel furnished under this Contract, submit manufacturer's name, catalog data, and the following information:
 - 1. Panelboard / distribution panel type.
 - 2. Main bus and terminal connection sizes.
 - 3. Location of line connections.
 - 4. Cabinet dimension.
 - 5. Gutter space.
 - 6. Gauge of boxes and fronts.
 - 7. Finish data.
 - 8. Voltage rating.
 - 9. Breaker manufacturer, types, trip rating, and interrupting ratings.
 - 10. When information is available on the Drawings, show breaker circuit numbers and locations along with trip ratings on a panelboard layout.

- B. Single Submittal - A single complete submittal is required for all products covered by this Section.
- C. Closeout Submittals: Submit operation and maintenance data for panelboards and circuit breakers including nameplate data, parts lists, factory and field test reports, recommended maintenance procedures and typewritten as-built panel schedules. Submit in accordance with Division 01.

PART 2 – PRODUCTS

2.1 PANELBOARDS

- A. General: Lighting and Receptacle Panelboards shall be the automatic circuit breaker type. The number and arrangement of circuits, trip ratings, spares and blank spaces for future circuit breakers shall be as shown on the Drawings or, if not shown, 42 circuits. All circuit breakers shall be quick-make, quick-break, thermal-magnetic, bolt-on type (unless otherwise noted on drawings), with 1, 2 or 3 poles as shown, each with a single operating handle. Tandem or piggy-back breakers shall not be used.
- B. Nameplates:
 - 1. Each panelboard shall have a field mounted identifying, rigid, plastic nameplate giving the panel identification as shown on the Drawings.
 - 2. Each panelboard shall have a manufacturer's nameplate showing the voltage, bus rating, number of phases, frequency and number of wires.
- C. Construction:
 - 1. Door and trim shall be finished to match finish type and color of surrounding wall. Box shall be hot-dip galvanized, field finished to match the front.
 - 2. Panelboards and enclosures shall conform to requirements of all relevant codes. Panelboards shall be suitable for use as service equipment.
 - 3. Panelboards shall be furnished with hinged trim fronts with key latch and a typed directory card and holder. Panelboard circuits shall be arranged with odd numbers on the left and even numbers on the right. Provide weatherproof, NEMA type 3R enclosures for outdoor installation.
- D. Busbars: Panelboard busbars shall be phase sequence type suitable for bolt-on circuit breakers. All busbars shall be copper.
- E. Circuit Breakers: Circuit breakers shall be the molded case type with trip and interrupting ratings as shown on the Drawings.
- F. Manufacturer:
 - 1. Panelboard manufacturer shall be Square D, Siemens and Eaton Cutler Hammer.

PART 3 – EXECUTION

- 3.1 INSTALLATION: Panelboards and Distribution Panels shall be installed where indicated on the Drawings, and in accordance with the manufacturer's instructions.
- 3.2 MOUNTING
- A. Panelboards and Distribution Panels shall be mounted with the top of the box 6'-6" above the floor. Panelboards and Distribution Panels shall be plumb within 1/8-inch. The highest breaker operating handle shall not be higher than 72 inches above the floor.
- 3.3 FIELD TESTS
- A. Insulation Resistance Tests: Perform insulation resistance tests on circuits with #2 AWG and larger conductors to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests after all equipment has been connected, except that equipment which may be damaged by the test voltage shall not be connected. Test the insulation with a 500Vdc insulation resistance tester with a scale reading 100 mega ohms. The insulation resistance shall be 2 mega ohms or more. Submit results for review.
- B. Grounding: Grounding shall conform to Section 260526.
- C. Continuity: Panelboard and Distribution Panel circuits shall be tested for continuity prior to energizing. Continuity tests shall be conducted using a dc device with a bell or buzzer.

END OF SECTION 262416

SECTION 262726 – DEVICES WIRING

PART 1 – GENERAL

1.1 Description of Work

A. The work of this section consists of:

1. Furnishing, installing, and connecting all duplex receptacles complete with wall plates and/or covers, as shown on the Drawings.
2. Furnishing, installing and connecting all light switches complete with wall plates and or handle operators, as shown on the Drawings.

1.2 Related Work:

A. See the following specification sections for work related to the work of this section:

1. 260542 Conduits, Raceways and Fittings.
2. 260519 Line Voltage Wire and Cable.
3. 260533 Junction and Pull Boxes.

1.3 Submittals: As specified in Section 260500 and Division 01.

A. Submit manufacturers published descriptive literature properly marked to identify the items to be supplied.

B. A single complete submittal is required for all products covered by this Section.

PART 2 – PRODUCTS

2.1 Receptacles:

A. General - Receptacles shall be heavy duty, high abuse, grounding type.

B. Duplex Receptacles:

1. Receptacles shall be specification grade, rated 20 ampere, two-pole, 3-wire, 125 volt, NEMA 5-20 configuration, self-grounding with screw terminals. Color shall be as selected by the Architect.
2. Devices shall have a nylon face, back and side wired.
3. Manufacturer: Hubbell #DR20 Series, Leviton #16352 Series.

C. GFCI Receptacles:

1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volt, conforming to NEMA 5-20 configuration. Face shall be nylon composition. Unit shall have an LED type red indicator light, test and reset push buttons. Color shall be as selected by the Architect.
2. GFCI component shall meet UL 943 Class A standards with a tripping time of 1/40 second at 5 milliamperes current unbalance. Operating range shall extend from -31°F to 158°F. Unit shall have transient voltage protection and shall be ceramic encapsulated for protection against moisture.
3. Manufacturer: Hubbell #GF20__LA Series, Leviton #7899 Series.

D. Automatically Controlled Receptacles

1. Receptacles shall be specification grade, rated 20 amperes, two pole, 3-wire, 125V, NEMA 5-20 configuration, self-grounding with screw terminals. Color shall be selected by the Architect.
2. Devices shall have a nylon face, back and side wired. Marking permanently printed, molded, or stamped on the face of the receptacle and in compliance with controlled receptacle marking requirements stated in California Building Energy Efficiency Standards Section 130.5(d)(3).
3. Manufacturer: Pass & Seymour 26352CD (Dual Controlled Receptacle), 26352CH (Half Controlled Receptacle); Leviton 16352-1 (Half Controlled Receptacle), Leviton 16352-2 (Dual Controlled Receptacle).

E. Weather Resistant GFCI Receptacles:

1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volt, conforming to NEMA 5-20 configuration, Face shall be nylon composition. Unit shall have a LED type red indicator light, test and reset push buttons. Color shall be as selected by the architect.
2. GFCI component shall meet UL 943 Class A standards with a tripping time of 1/40 second at 5 milliamperes current unbalance. Operating range shall extend from -31°F to 158°F. Unit shall have transient voltage protection and shall be ceramic encapsulated for protection against moisture.
3. Manufacturer: Hubbell #GFTR20__Series, Leviton # W7899-TR Series.

F. Surge Suppression Receptacles:

1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volt. Face shall be nylon composition. Unit shall have an LED type "Power-on" indication light and damage-alert audible alarm. Color shall be as selected by the Architect.
2. Surge suppression protection shall be listed to UL standard 1449 and shall instantly absorb a transient surge of 6,000 volts minimum. A minimum of four (4) Metal Oxide Varistors shall be utilized to absorb transients.
3. Manufacturer: Hubbell #HBL8362S Series, Leviton #8380 Series.

2.2 Switches:

- A. Switches shall be rated 20 amperes to 120/277 volts ac. Units shall be flush mounted, self-grounding, quiet operating rocker devices. Rocker color shall be as selected by the Architect.
 - 1. Manufacturer: Hubbell #DS_20__ Series, Leviton #5621 Series. See plans for single pole, three way and four way requirements.
- B. Timed switches: Shall be as designed by Paragon Electric Company # ET2000f or Watt Stopper TS-200 rated for the voltage specified on drawings. Time-out shall be adjustable from 5 minutes up to 12 hours. Unit shall be provided with warning alarm.
- C. Dimmer switches: Switch shall be as specified on drawings, color per architect. Heat fins shall not be removed, where dimmer switches are ganged together, care shall be taken to install correct size backbox to accommodate switches without removing fins.

2.3 Plates:

- A. General - Plates shall be of the style and color to match the wiring devices, and of the required number of gangs. Plates shall conform with NEMA WD 1, UL 514 and FS W-P-455A. Plates on finished walls shall be non-metallic or stainless steel. Plates on unfinished walls and on fittings shall be of zinc plated steel or case metal and shall have rounded corners and beveled edges.
- B. Non-Metallic: Plates shall be plain with beveled edges and shall be nylon or reinforced fiberglass.
- C. Stainless Steel: Plates shall be .040 inches thick with beveled edges and shall be manufactured from No. 430 alloy having a brushed or satin finish.
- D. Cast Metal: Plates shall be cast or malleable iron covers with gaskets so as to be moisture resistant or weatherproof.
- E. Blank Plates: Cover plates for future telephone outlets shall match adjacent device wall plates in appearance and construction.
- F. Weatherproof Plate: Cover plates in wet and damp locations shall have recessed in-use covers, Taymac or equal. Back box shall be suitable for the wall material where it is installed.
- G. Labeling: All switch and receptacle plates shall be labeled on the top portion of the plate with the panelboard and circuit number serving that device. Lettering shall be 3/16" minimum high, black color, on clear Mylar 3/8" tape. Manufactured by P-touch or equal.

PART 3 – EXECUTION

3.1 Installation of Wiring Devices:

- A. Interior Locations: In finished walls, install each device in a flush mounted box with washers as required to bring the device mounting strap level with the surface of the finished wall. On unfinished walls, surface mount boxes level and plumb.

B. Mounting Heights: Adjust boxes so that the front edge of the box shall not be farther back from the finished wall plane than 1/4-inch. Adjust boxes so that they do not project beyond the finished wall. Height of device shall be as follows unless otherwise noted on the drawings:

1. Receptacles 15 Inches from finished floor to bottom of box.
2. Toggle Switches 48 Inches from finished floor to top of box.

C. Receptacles:

1. Ground each receptacle using a grounding conductor, not a yoke or screw contact.
2. Install receptacles with connections spliced to the branch circuit wiring in such a way that removal of the receptacle will not disrupt neutral continuity and branch circuit power will not be lost to other receptacles in the same circuit.

3.2 Installation of Wall Plates:

- A. General - Plates shall match the style of the device and shall be plumb within 1/16-inch of the vertical or horizontal.
- B. Interior Locations, Finished Walls: Install non-metallic plates so that all four edges are in continuous contact with the finished wall surfaces. Plaster filling will not be permitted. Do not use oversized plates or sectional plates.
- C. Interior (not wet) Locations, Unfinished Walls: Install stainless steel or cast metal cover plates.
- D. Wet Locations: Install cast metal plates with gaskets on wiring devices in such a manner as to provide a rain tight weatherproof installation. Cover shall be lockable outdoor "in use" type.
- E. Future Locations: Install blanking cover plates on all unused outlets.

3.3 Tests:

A. Receptacles:

1. After installation of receptacles, energize circuits and test each receptacle to detect lack of ground continuity, reversed polarity, and open neutral condition.

END OF SECTION 262726

SECTION 262816 CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 Description of Work:

- A. The work of this Section consists of providing circuit breakers as shown on the Drawings and as described herein.

1.02 Related Work: See the following Specification Sections for work related to the work in this Section.

- A. 26 05 00 General Electrical Requirements
- B. 26 24 16 Panelboards

1.03 Submittals:

- A. Shop Drawings - Submittals shall be in accordance with Section 260500 and Division 01. For each circuit breaker furnished under this Contract, submit manufacturer's name, catalog data, and the following information:
 - 1. Terminal connection sizes.
 - 2. Voltage rating.
 - 3. Breaker manufacturer, types, trip ratings and interrupting ratings.
- B. Single Submittal - A single complete submittal is required for all products covered by this Section.
- C. Closeout Submittals: Submit in accordance with and Section 260500, operation and maintenance data for circuit breakers including nameplate data, parts lists, manufacturer's circuit breaker timer, current, coordination curves, factory and field test reports and recommended maintenance procedures.

PART 2 - PRODUCTS

2.01 Circuit Breaker: Each circuit breaker shall consist of the following:

- A. A molded case breaker with an over center toggle-type mechanism, providing quick-make, quick-break action. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Multipole circuit breakers shall have variable magnetic trip elements which are set by a single adjustment to assure uniform tripping characteristics in each pole. Circuit breakers shall be of the bolt-on type unless otherwise noted.
- B. Breaker shall be calibrated for operation in an ambient temperature of 40°C.
- C. Each circuit breaker shall have trip indication by handle position and shall be trip-free.

- D. Three pole breakers shall be common trip.
- E. The circuit breakers shall be constructed to accommodate the supply connection at either end of the circuit breaker. Circuit breaker shall be suitable for mounting and operation in any position.
- F. Breakers shall be rated as shown on Drawings.
- G. Circuit breaker and/or Fuse/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations for use in the end use equipment in which it is installed. Any series rated combination used shall be marked on the end use equipment per CEC section 110-22.
- H. Breakers shall be UL listed. Circuit breakers shall have removable lugs.
- I. Lugs shall be UL listed for copper and aluminum conductors.
- J. Breakers shall be UL listed for installation of mechanical screw type lugs.
- K. Circuit breakers serving HACR rated loads shall be HACR type. Circuit breakers serving other motor loads shall be motor rated.

PART 3 - EXECUTION

3.01 Mounting:

- A. The highest breaker operating handle shall not be higher than 72 inches above the floor.

END OF SECTION 262416

SECTION 265100 - LIGHTING

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. The work of this section consists of providing a lighting system complete, including fixtures, lamps, hangers, reflectors, glassware, lenses, auxiliary equipment, ballasts and sockets.

1.2 RELATED WORK

- A. See the following specification sections for work related to the work of this section:

- 1. 260500 General Electrical Requirements.
- 2. 260542 Conduit, Raceway and Fittings.
- 3. 260519 Line Voltage Wire and Cable.
- 4. 260533 Junction and Pull Boxes.

1.3 SUBMITTALS: IN accordance with Division 01.

- A. Submit descriptive data, photometric curves for each fixture configuration proposed.
- B. Submit shop drawings showing proposed methods for mounting lighting fixtures.
- C. Seismic Requirements: Submit:
 - 1. Sketch or description of the anchorage system.
- D. Submit Operation and Maintenance Data per Division 01.

- 1.4 Warranty: High Intensity Discharge lamps which fail within the first year after final acceptance shall be replaced by the Contractor with the warranty clause of the General Provisions.

PART 2 – PRODUCTS

2.1 FIXTURES

- A. Fixtures shall be of the types, wattage's and voltages shown on the Drawings and be UL classified and labeled for the intended use.
- B. Substitutions will not be considered unless the photometric distribution curve indicates the proposed fixture is equal to or exceeds the specified luminaire.

- C. Luminaire wire, and the current carrying capacity thereof shall be in accordance with the CEC.
- D. Luminaires and lighting equipment shall be delivered to the project site complete, with suspension accessories, aircraft cable, stems, canopies, hickey, castings, sockets, holders, ballasts, diffusers, frames, and related items, including support and braces.

2.2 BALLASTS

- A. Ballasts shall be of the types shown on the drawings. Ballasts shall be CBM certified and bear the UL label. Magnetic ballasts shall be the high power factor type. Electronic ballasts shall be suitable for lamps specified by Advance, Magnetek/Universal, Motorola or approved equal. Electronic ballast shall be CBM certified and have a 10% maximum total harmonic distortion.
- B. All ballasts for fixtures installed outdoors shall provide reliable starting of lamps at 0°F at 90% of the nominal line voltage.
- C. Ballasts producing excessive noise (above 36 dB) or vibration will be rejected and shall be replaced at no expense to the Owner.

2.3 LAMPS

- A. Lamps shall be new at the time of acceptance and shall be General Electric, Osram /Sylvania, Phillips, or approved equal.
- B. Unless otherwise noted on the drawings, lamps shall be third generation T8, 3500°K, and 85 CRI minimum.
 - 1. Third Generation: Also known as High-Performance, Higher Lumen, or Super, the third generation of 32 Watt T8 lamps offers 3,100 lumens and a long-life rating of 24,000 hours. Efficacy is high, with lumens per watt in the range of 94 to 100. CRI is 82 to 86.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. All fixtures and luminaires shall be clean and lamps shall be operable at the time of acceptance.
 - 2. Install luminaires in accordance with manufacturer's instructions, complete with lamps, ready for operation as indicated.
 - 3. Align, mount, and level the luminaires uniformly.

4. Avoid interference with and provide clearance for equipment. Where an indicated position conflicts with equipment locations, change the location of the luminaire by the minimum distance necessary.

B. Mounting and Supports:

1. Mounting heights shall be as shown on the Drawings. Unless otherwise shown, mounting height shall be measured to the centerline of the outlet box for wall mounted fixtures and to the bottom of the fixture for suspended fixtures and to the bottom of the fixture for all other types.
2. Luminaire supports shall be anchored to structural members.
3. Pendant stem mounted luminaires shall be provided with ball aligners to assure a plumb installation and shall have a minimum 45 degree clean swing from horizontal in all directions. Sway bracing shall be installed as required to limit the movement of the fixture. Fixtures shall be allowed to sway a maximum of 45° without striking any object.
4. Fixture supports shall be designed to resist earthquake forces of seismic zone 4.
5. Refer to fixture mounting details on drawings for installation requirements.
6. Pendant cable mounted luminaires shall be provided with fully adjustable stainless steel aircraft cable hangers unless otherwise noted on the Drawings.

4.01 Lighting Controls Support Services:

A. System Start Up and Commissioning

1. Manufacturer shall provide a factory authorized technician to confirm proper installation and operation of the lighting control panels, switches, and occupancy sensors.
2. The technician shall provide training on the lighting control features of the system and shall verify that the panel(s) is communicating with the building automation system.
3. The technician shall provide 1 – day of additional training and configuration of operation 60 days after final acceptance of project by owner.
4. The system integrator or BAS vendor shall be responsible for all integration including the mapping of BACnet objects into the BAS logic, schedules and graphics.

4.02 Acceptance Testing Support Services:

- A. On all California projects, a certified lighting controls acceptance test technician (CLCATT) must verify the installation of the lighting control system. Manufacturer should include an extra day of factory technician's time to assist the CLCATT review the functionality and settings of the lighting control hardware per the requirements in the California State forms. It will be the CLCATT's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the CLCATT with this task.

4.03 Lighting Control Installation Certificate Requirements:

- A. When certification is required by Title 24, Part 1, Section 10-103-A, the acceptance testing specified by Section 130.4 shall be performed by a Certified Lighting Controls Acceptance Test Technician (CLCATT) employed or hired by the electrical contractor. If the CLCATT is operating as an employee, the CLCATT shall be employed by a Certified Lighting Controls Acceptance Employer. The CLCATT shall disclose on the Certificate of Acceptance a valid CLCATT certification identification number issued by an approved Acceptance Test Technician Provider. The CLCATT shall complete all Certificate of Acceptance documentation in accordance with the applicable requirements in Section 10-103(a)4.
- B. Lighting Control Installation Certificate Requirements. To be recognized for compliance with Part 6 an Installation Certificate shall be submitted in accordance with Section 10-103(a) for any lighting control system, Energy Management Control System, track lighting integral current limiter, track lighting supplementary overcurrent protection panel, interlocked lighting system, lighting Power Adjustment Factor, or additional wattage available for videoconference studio, in accordance with the following requirements, as applicable:
 - 1. Certification that when a lighting control system is installed to comply with lighting control requirements in Part 6 it complies with the applicable requirements of Section 110.9; and complies with Reference Nonresidential Appendix NA7.7.1.
 - 2. Certification that when an Energy Management Control System is installed to function as a lighting control required by Part 6 it functionally meets all applicable requirements for each application for which it is installed, in accordance with Sections 110.9, 130.0 through 130.5, 140.6 through 150.0, and 150.2; and complies with Reference Nonresidential Appendix NA7.7.2.
 - 3. Certification that line-voltage track lighting current limiters comply with the applicable requirements of Section 110.9 and installed wattage has been determined in accordance with Section 130.0©; and comply with Reference Nonresidential Appendix NA7.7.3.
 - 4. Certification that line-voltage track lighting supplemental overcurrent protection panels comply with the applicable requirements of Section 110.9 and installed wattage has been determined in accordance with Section 130.(c); and comply with Reference Nonresidential Appendix NA7.7.4.
 - 5. Certification that interlocked lighting systems used to serve an approved area comply with Section 140.6(a)1; and comply with Reference Nonresidential Appendix NA7.7.5.
 - 6. Certification that lighting controls installed to earn a lighting Power Adjustment Factor (PAF) comply with Section 140.6(a)2; and comply with Reference Nonresidential Appendix NA7.7.6.
 - 7. Certification that additional lighting wattage installed for a videoconference studio complies with Section 140.6(c)Gvii; and complies with Reference Nonresidential Appendix NA 7.7.7.

END OF SECTION 265100

SECTION 321313 - 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 Concrete Paving for the following:
 - 1. Driveways.
 - 2. Parking lots.
 - 3. Curbs and gutters.
 - 4. Walks.
- B. Related Requirements:
 - 1. Section 321726 "Tactile Warning Surfacing" for detectable warning mats.

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 manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
 - 1. Aggregates
- D. Field quality-control test reports.
- E. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
 - 1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete producer.
 - d. Concrete pavement subcontractor.

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 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves with a radius 100 feet (30.5 m) or less.
- B. 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. Products: Subject to compliance with requirements, provide the following:
 - a. Meadows, W. R., Inc.
 - 1) Duogard II
 - b. Approved Equal.

2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
 1. Portland Cement: ASTM C 150, Type II, gray
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate, uniformly graded. Provide aggregates from a single source.
 1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M.

2.5 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

- B. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Meadows, W. R., Inc.
 - 1) Vocomp-20.
 - b. Approved Equal.
- C. Water: Potable.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 3000 psi (20.7 MPa).
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
 - 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
- C. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

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 for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings 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 pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 50 feet (15.25 m), 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. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch (6-mm) radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. 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.
- C. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- D. Do not add water to concrete during delivery or at Project site.

- E. 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.
- F. 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.
- G. Screed pavement surfaces with a straightedge and strike off.
- H. 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.

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. Slopes less than 6%: Slip resistant to a medium salted finish.
 - 2. Slopes 6% or greater: Same as above with added slip-resistive aggregate finish.

3.8 SPECIAL FINISHES

- A. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on pavement surface according to manufacturer's written instructions and as follows:
 - 1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) dampened slip-resistive aggregate over pavement surface in 2 applications. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.
 - 2. Uniformly distribute approximately two-thirds of slip-resistive aggregate over pavement surface with mechanical spreader, allow to absorb moisture, and embed by power floating. Follow power floating with a second slip-resistive aggregate application, uniformly distributing remainder of material at right angles to first application to ensure uniform coverage, and embed by power floating.
 - 3. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
 - 4. After curing, lightly work surface with a steel wire brush or abrasive stone and water to expose nonslip aggregate.

3.9 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. 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 (1 kg/sq. m 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. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 - 1. Moist 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 (300-mm) lap over adjacent absorptive covers.
 - 2. 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.

3.10 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
 - 1. Elevation: 1/4 inch (6 mm).
 - 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
 - 3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mix placed each day.

- a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
- 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
- 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
- 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
- 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
- 6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- C. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 323113 - CHAIN LINK FENCES AND GATES

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. Chain-link fences.
 - 2. Privacy slats.

- B. Related Requirements:

- 1. **Section 033000 "Cast-in-Place Concrete** for cast-in-place concrete **post footings**.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **Project site**.

- 1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
 - 2. Review coordination of interlocked equipment specified in this Section and elsewhere.

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 for the following:
 - a. Fence and gate posts, rails, and fittings.
 - b. Chain-link fabric, reinforcements, and attachments.
 - c. Accessories: **Privacy slats**.
 - d. Gates and hardware.

- B. Shop Drawings: For each type of fence and gate assembly.

- 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Include accessories, hardware, gate operation, and operational clearances.

- C. Samples for Initial Selection: For each type of factory-applied finish.
- D. Samples for Verification: For each type of component with factory-applied finish, prepared on Samples of size indicated below:
 - 1. Polymer-Coated Components: In 6-inch (150-mm) lengths for components and on full-sized units for accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of chain-link fence and gate.
- B. Field quality-control reports.
- C. Sample Warranty: For special warranty.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.7 WARRANTY

- A. Special Warranty: **Installer agrees** to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to comply with performance requirements.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Faulty operation of gate operators and controls.
 - 2. Warranty Period: **15** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Privacy fencing system:
 - 1. By PrivacyLink, LLC – Mesh with Supreme Privacy Slats
 - a. PO Box 295
 - b. Hyde Park, Utah 84318

2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
1. Fabric Height: **As indicated on Drawings.**
 2. Steel Wire for Fabric: Wire diameter of 8 ga. finish (9 ga. core)
 - a. Mesh Size: **3-1/2 inches x 5 inches.**
 - b. Polymer-Coated Fabric: ASTM F 668, **Class 2b**-coated steel wire.
 - 1) Color: **Black**, according to ASTM F 934.
 - c. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.
 3. Selvage: **Knuckled at both selvages.**

2.3 FENCE FRAMEWORK

- A. Posts and Rails <**Insert drawing designation**>: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043[**or ASTM F 1083**] based on the following:
1. Fence Height: **As indicated on Drawings.**
 2. Heavy-Industrial-Strength Material: **Group IA, round steel pipe, Schedule 40.**
 - a. Line Post: **2.375 inches (60 mm) in diameter.**
 - b. End, Corner, and Pull Posts: **2.875 inches (73 mm) in diameter.**
 3. Horizontal Framework Members: **Intermediate, top and bottom** rails according to ASTM F 1043.
 - a. Top Rail: **1.66 inches (42 mm) in diameter.**
 4. Brace Rails: ASTM F 1043.
 5. Metallic Coating for Steel Framework per manufacturers specificaiton:
 - a. Type A: Not less than minimum **2.0-oz./sq. ft. (0.61-kg/sq. m)** average zinc coating according to ASTM A 123/A 123M or **4.0-oz./sq. ft. (1.22-kg/sq. m)** zinc coating according to ASTM A 653/A 653M.
 - b. Type B: Zinc with organic overcoat, consisting of a minimum of **0.9 oz./sq. ft. (0.27 kg/sq. m)** of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.
 - c. External, Type B: Zinc with organic overcoat, consisting of a minimum of **0.9 oz./sq. ft. (0.27 kg/sq. m)** of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than **0.3-mil- (0.0076-mm-)** thick, zinc-pigmented coating.

- d. Type C: Zn-5-Al-MM alloy, consisting of not less than 1.8-oz./sq. ft. (0.55-kg/sq. m) coating.
 - e. Coatings: Any coating above.
6. Polymer coating over metallic coating.
- a. Color: **Match chain-link fabric**, according to ASTM F 934.

2.4 SWING GATES

- A. General: ASTM F 900 for gate posts and **single** or **double** swing gate types.
 - 1. Gate Leaf Width: **As indicated**.
 - 2. Framework Member Sizes and Strength: Based on gate fabric height **as indicated**.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; **protective coating and finish to match fence framework**.
 - 2. Gate Posts: **Round tubular steel**.
 - 3. Gate Frames and Bracing: **Round tubular steel**.
- C. Frame Corner Construction: **Welded or assembled with corner fittings**.
- D. Hardware:
 - 1. Hinges: **360-degree inward and outward** swing.
 - 2. Latch: Permitting operation from both sides of gate **with provision for padlocking accessible from both sides of gate**.
 - 3. Lock: **Manufacturer's standard** internal device.

2.5 FITTINGS

- A. Provide fittings according to ASTM F 626.
- B. Post Caps: Provide for each post.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 - 1. Top Rail Sleeves: **Pressed-steel or round-steel tubing** not less than 6 inches (152 mm) long.
 - 2. Rail Clamps: Line and corner boulevard clamps for connecting **intermediate and bottom** rails to posts.
- E. Tension and Brace Bands: **Pressed steel**.

- F. Tension Bars: **Steel**, length not less than **2 inches (50 mm)** shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: **Steel, hot-dip galvanized after threading** rod and turnbuckle or other means of adjustment.
 - 1. Single-Arm Type: **Type I, slanted arm or Type II, vertical arm.**
- H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
 - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:
 - a. Hot-Dip Galvanized Steel: **galvanized coating thickness matching coating thickness of chain-link fence fabric.**
- I. Finish:
 - 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than **1.2 oz./sq. ft. (366 g/sq. m)** of zinc.
 - a. Polymer coating over metallic coating.

2.6 PRIVACY SLATS

- A. Tubular Polyethylene Slats: Minimum **0.023-inch (0.58-mm)**-thick tubular polyethylene, manufactured for chain-link fences from virgin polyethylene with UV inhibitor, sized to fit mesh specified for direction indicated, with **vandal-resistant fasteners and lock strips.**
- B. Hedge-Type Slats: UV-light-stabilized, **flame-resistant**, PVC "needles" woven into braided, galvanized wire core, sized to fit mesh specified for direction indicated.
- C. Color: Black.

2.7 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for **a certified survey of property lines and legal boundaries**, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of **500 feet (152 m)** or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.
 - 1. Install fencing on established boundary lines inside property line.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts **in concrete** at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of **15 degrees or more**. For runs exceeding **500 feet (152 m)**, space pull posts an equal distance between corner or end posts.
- E. Line Posts: Space line posts uniformly at **96 inches (2440 mm)** o.c.
- F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at midheight of fabric **72 inches (1830 mm)** or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
 2. Extended along **top and bottom** of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within **6 inches (152 mm)** of bottom of fabric and tie to each post with not less than same diameter and type of wire.
- G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- H. Intermediate and Bottom Rails: Secure to posts with fittings.
- I. Chain-Link Fabric: Apply fabric to **outside** of enclosing framework. Leave **1-inch (25-mm)** bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than **15 inches (380 mm)** o.c.
- K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
1. Maximum Spacing: Tie fabric to line posts at **12 inches (300 mm)** o.c. and to braces at **24 inches (610 mm)** o.c.
- L. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. **Peen ends of bolts or score threads to prevent removal of nuts.**
- M. Privacy Slats: Install slats in direction indicated, securely locked in place.
1. **Vertically for privacy factor of 70 to 75.**

3.4 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout

entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

- B. Lubricate hardware and other moving parts.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION 323113