

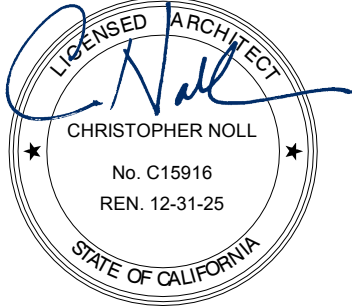




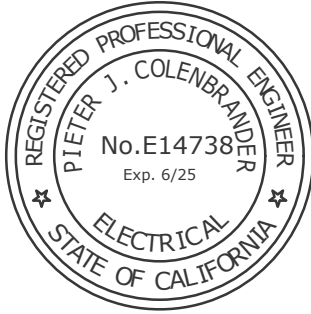

**SONOMA
COUNTY
LIBRARY**

**REQUEST FOR PROPOSALS
PROPOSAL AND CONTRACT DOCUMENTS
FOR
HEALDSBURG MODERNIZATION PROJECT**

Sealed bids will be received by hand delivery to: Attn: Dave Tichava, Sonoma County Library, 6135 State Farm Drive, Rohnert Park, CA 94928 during the hours of 10:00 a.m. to 4:00 p.m. (Monday through Friday) from 8:00 A.M., until 3:00 pm on July 26, 2024, at which time and place bids will be publicly opened and read aloud.]

SECTION 00 01 07 - SEALS PAGE

<p>ARCHITECT</p> <p>Firm: Name: License No. Expires:</p>	<p>Noll & Tam Architects Christopher Noll C15916 12/31/2025</p>	
<p>Signature:</p>		<p>Seal</p>
<p>CIVIL ENGINEER</p> <p>Firm: Name: License No. Expires:</p>	<p>CSW/ST2 Kristine N Pillsbury 61685 6/30/2025</p>	
<p>Signature</p>		<p>Seal</p>
<p>STRUCTURAL ENGINEER</p> <p>Firm: Name: License No. Expires:</p>	<p>ZFA Engineer Angela Sommer 6013 6/20/2024</p>	
<p>Signature</p>		<p>Seal</p>

<p>MECHANICAL ENGINEER</p> <p>Firm: Capital Engineering Name: Kevin Stillman License No.: M 33498 Expires: 9/30/24</p>		 <p>04/29/2024</p>
<p>Signature</p>		<p>Seal</p>
<p>ELECTRICAL ENGINEER</p> <p>Firm: O'Mahony & Myer Name: Pieter J. Colenbrander License No.: 14738 Expires: 6/25</p>		
<p>Signature</p>		<p>Seal</p>

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PART 1: PROPOSAL REQUIREMENTS

INVITATION TO BID

[Sealed bids will be received by hand delivery to: Attn: Dave Tichava, Sonoma County Library, 6135 State Farm Drive, Rohnert Park, CA 94928 during the hours of 10:00 a.m. to 4:00 p.m. (Monday through Friday) from 8:00 a.m., **until 3:00 pm on July 26, 2024**, at which time and place bids will be publicly opened and read aloud.]

The proposed work consists of renovation to the Healdsburg Library at 131 Piper St. Healdsburg. Work includes but is not limited to construction of certain improvements to the existing Library as set forth in the Contract Drawings and Technical Specifications for the project.

Completion of Work: All work shall be completed within:

- 365 working days from the date designated on the Notice to Proceed.

Obtaining Contract Documents: Contract Documents may be obtained [online at <https://sonomalibrary.org/about/contracting-opportunities>. Bidders can pick up and pay for plan sets:

Questions: Project-specific questions must be made in writing and sent to the Library's Representative at dtichava@sonomalibrary.org. The cutoff date for submittal of questions is **5:00 pm on July 19th, 2024**. local time.

Job Walk: There will be a job walk on July,8th, **2024 – 9:00am**, at 139 Piper Street, Healdsburg, California. Attendance at the job walk is highly recommended but is not mandatory.

- **Prospective Bidder that wants to attend the walk shall submit a request via email to Dave Tichava at dtichava@sonomalibrary.org.**

Submission of Proposals: All proposals must be submitted not later than the date and time prescribed. The Bidder is wholly responsible to ensure its bid is submitted on the date and at the time and place designated for the opening of bids. Any bid received after the time and date specified shall not be considered. Any bid may be withdrawn prior to the scheduled time for opening bids. Each bid must conform and be responsive to this notice and shall be made on the official proposal forms furnished with the Contract Documents.

Bid Security: Each proposal must be accompanied by a Bid Security in the form of a cashier's check, certified check, or bid bond executed on the prescribed form, in an amount not less than ten percent (10%) of the total bid price payable to the Sonoma County Library. Bidders are hereby notified that in accordance with the provisions of Public Contract Code section 22300, securities may be substituted for any monies which the Library may withhold pursuant to the terms of this Contract to ensure performance.

Contractor's License: Bidder must possess a current Class B General Contracting license issued by the State of California, at the time the bid is submitted.

Contractor Registration: All Bidders and listed subcontractors must have registered with the California State Department of Industrial Relations pursuant to Labor Code section 1725.5 prior to submitting a bid. Furthermore, a Contractor and all subcontractors must be registered pursuant to Labor Code section 1725.5 before entering into a contract to work on a public project.

Award: The award made to the lowest responsible Bidder whose proposal complies with the specified requirements. Lowest number shall be determined on the Bidders' base bid plus alternates. The award of the Contract will be made by the Sonoma County Library Commission, and the Contractor shall execute the Contract within ten (10) days after it has received the Contract from the Library. The Library reserves the right to waive any irregularity in the proposals. No bid may be withdrawn for a period of sixty (60) days after the opening of bids.

Rejection of Bids: The Library reserves the right to reject any and all bids, or to waive immaterial irregularities in any bid. Any bid not conforming to the intent and purpose of the Contract Documents may be rejected. The Library reserves the right to make all awards in the best interest of the Library.

Disqualification of Bidder: If there is a reason to believe that collusion exists among any Bidders, none of the bids of the participants in such collusion will be considered and the Library may likewise elect to reject all bids received.

Wage Rates: Bidders are hereby notified that the California Department of Industrial Relations has determined the general prevailing rate of wages for each craft, classification, or type of worker needed to execute the work. Copies of the current schedules for prevailing wages applicable to this project are on file in the Library's office. It shall be mandatory for the Contractor and any subcontractor under it to pay not less than the said specified rates to laborers and workmen employed by them in the execution of the Contract.

Bonds: The successful Bidder will be required to furnish a payment bond in an amount equal to one hundred percent (100%) of the Contract price, and a faithful performance bond in an amount equal to one hundred percent (100%) of the Contract price.

INSTRUCTIONS TO BIDDERS

Each bid shall be in accordance with the Contract Documents.

1. Plans

Additional copies of full scale plans may be obtained as specified in the Invitation to Bid.

2. Local Conditions

(a) The Bidder shall examine carefully the site of the work contemplated and the Contract Documents. The submission of a proposal shall be conclusive evidence that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality and quantities of work to be performed and the materials to be furnished, and as to the requirements of the Contract Documents.

(b) Where the Engineer has made investigations of surface and subsurface conditions in areas where work is to be performed under the Contract, or in other areas, some of which may constitute possible local material sources, such investigations were made only for the purpose of study and design. Where such investigations have been made, bidders or Contractor may, upon written request, inspect the records of the Engineer as to such investigations subject to and upon the conditions hereinafter set forth. Such inspection of records may be made at the office of the Engineer.

(c) The records of such investigations are not a part of the Contract and are made available for inspection solely for the convenience of the bidder or Contractor. It is expressly understood and agreed by bidder or Contractor that neither the Library nor the Engineer assumes any responsibility whatsoever with respect to the sufficiency or accuracy of the investigations thus made, the records thereof, or of the interpretation set forth therein or made by the Engineer in his use thereof and there is no representation, warranty or guarantee, either express or implied, that the conditions indicated by such investigations or records thereof are correct or representative of those existing throughout such areas or any part thereof, or that unanticipated developments may not occur or that materials other than, or in proportions different from, those indicated may not be encountered.

(d) The availability or use of information described in this section or the special conditions (if applicable) is not to be construed in any way as a waiver of the provisions of this section and a bidder or Contractor is cautioned to make such an investigation and examination as it deems necessary to satisfy itself as to conditions to be encountered in the performance of the work and, with respect to possible local material sources, the quality and quantity of material available from such property and the type and extent of processing that may be required in order to produce material conforming to the requirements of the Specifications.

(e) No information derived from such inspection of records of investigations or compilations thereof made by the Engineer or the Engineer's assistants, will in any way relieve the bidder or Contractor from any risk or from properly fulfilling the terms of the Contract.

(f) Information derived from inspection of topographic maps, or from Plans showing location of utilities and structures will not in any way relieve the Contractor from any risk, or from properly examining the site and making such additional investigations as it may elect, or from properly fulfilling all the terms of the Contract.

(g) Each bidder shall inform itself of, and the bidder awarded a Contract shall comply with, federal, state and local laws, statutes, and ordinances relative to the execution of the work. This requirement includes, but is not limited to, applicable regulations concerning employment of labor, protection of public and employee safety and health, protection, the protection of natural resources, fire protection, burning and non-burning requirements, permits, fees, and similar subjects.

3. Form of Bid and Signature

(a) Bids shall be submitted only on the forms attached hereto and shall be enclosed in a sealed envelope and marked and addressed as hereinafter directed. The Bidder shall state in figures the unit prices or the specific sums as the case may be, for which it proposes to supply the labor, materials, supplies or machinery, and perform the work required by the Specifications. Bid prices will be deemed to include all applicable fees and taxes including sales tax. If the Bid is made by an individual, it shall be signed by the individual and the individual's full name and address shall be given; if it is made by a partnership, it shall be signed with the co-partnership name by a member of the partnership, who shall also sign the member's own name, and the name and address of each member of such partnership shall be given; and, if it is made by a corporation, the name of the corporation shall be given and it shall be signed by its duly authorized officer or officers attested by the corporate seal, the name and titles of all officers of the corporation shall be given, and the address of the corporation and the state in which incorporated shall be stated.

(b) Bids will be considered only from persons or entities licensed as required under applicable provisions of the Contractor's License Law (Cal. Bus. and Prof. Code section 7000, et seq.) and rules and regulations adopted pursuant thereto; and each bidder shall insert its type of contractor's license, license number, and other requested information in the place provided in the bid. No oral, telephonic or facsimile Bid or modification of a Bid will be considered.

4. Submittal of Bids

(a) All Bids must be submitted not later than the time prescribed, at the place and in the manner set forth in the Invitation to Bid. Bids must be made on the prescribed Bid Forms. A complete Bid requires submission of all documents identified in subsection (d) below. Each Bid must be submitted in a sealed envelope addressed to Sonoma County Library, Attn: Dave Tichava, 6135 State Drive, Rohnert Park, CA 94928 during the hours of 10:00 a.m. to 4:00 p.m. (Monday through Friday) from July, 1st, 2024, **until not later than 3:00 pm on July, 26, 2024** and designated as a Bid bearing the name of the bidder and name of the project. The bidder is wholly responsible to see that its Bid is submitted at the time and place named for the opening of bids.

(b) Bids shall include all addenda or clarifications issued during the bidding period acknowledged by the bidder's signature thereon. Failure to so include or acknowledge an addendum or clarification may result in the Bid being rejected as not responsive.

(c) Bids shall be opened at the time and place specified in the Invitation to Bid, unless changed by addendum.

(d) Bid documents to be submitted shall include the following:

(1) Completed Bid Proposal

- (2) Proposal Signature Sheet;
- (3) Bid security (if a bid bond, to be accompanied by power of attorney, both executed and notarized)
- (4) Non-Collusion Declaration
- (5) Experience Qualification Form
- (6) Completed Subcontractor List
- (7) Bidder's Checklist
- (8) If a Federal-Aid project, all required DBE documentation and anti-lobbying documentation.

5. Preparation of Bid

Blank spaces in the Bid shall be properly completed. The phraseology of the Bid must not be changed and no additions shall be made to the items mentioned therein. Unauthorized conditions, limitations or provisions attached to a Bid will render it informal and may cause its rejection. If erasures, interlineations or other changes appear on the form, each erasure, interlineation or change must be initialed by the person signing the Bid. Alternative bids will not be considered unless specifically provided for in the Bidding Schedule. No Bid received after the time fixed, or received at any place other than the place stated in the Invitation to Bid will be considered. All bids will be opened and read publicly. Bidders, their representatives and other interested parties are invited to be present at the opening. Where bonds are required, the bidder shall name in its Bid the surety or sureties who have agreed to furnish said bonds.

6. Bid Security

(a) All Bids shall be accompanied by a Bid Security. Such Bid Security shall include cash, cashier's or certified check made payable to the Library or a Bid Bond executed by an admitted surety insurer. The Bid Security must be enclosed in the same envelope with the Bid. The amount of the Bid Security shall be not less than ten percent (10%) of the total amount of the Bid.

(b) The Attorney-in-Fact (resident agent) who executes the Bid Bond on behalf of the surety company must attach a copy of its Power of Attorney as evidence of its authority. A notary shall acknowledge the power as of the date of execution of the surety bond which it covers.

(c) Bid Bonds must be provided on the Bid Bond form furnished by the Library. The Bid Bond must be furnished by a company, acceptable to the Library, that is authorized and licensed by the Insurance Commissioner as an "admitted surety insurer" and that maintains at least one office in California for conducting business.

7. List of Subcontractors

(a) Each bidder shall set forth in its Bid on the form provided the following information in accordance with the provisions of Public Contract Code sections 4100-4113:

- (1) The name, contractor's license number, and the 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, specifically fabricates and installs a portion of the work or improvement according to the Contract Documents, in any amount in excess of one-half of one percent (0.5%) of the prime Contractor's total Bid, or ten thousand dollars (\$10,000), whichever is greater.
- (2) The portion of the work which will be done by each such Subcontractor. Only one Subcontractor shall be listed for each such portion of the work as defined in the Bid.
- (3) If the bidder fails to specify a Subcontractor for any portion of the work to be performed under the Contract, the bidder agrees to perform that portion of the work itself.

8. Interpretation of Contract Documents

Any explanation desired by the bidders regarding the meaning or interpretation of any of the Contract Documents must be submitted in writing at least five (5) calendar days prior to the bid opening. Requests for clarification received after the above noted deadline may be answered at the discretion of the Architect or Library Representative. Any such explanations or interpretations will be made in the form of Addenda to the documents and will be furnished to all bidders who shall submit all addenda with their Bids. Neither the Architect nor any representative of the Library is authorized to give oral explanations or interpretations of Contract Documents, and a submission of a Bid constitutes agreement by the bidder that it has placed no reliance on any such oral explanation or interpretation. However, the Architect may, upon inquiry by bidder, orally direct the bidder's attention to specific provisions of the Contract Documents which cover the subject of the inquiry.

9. Requests for Clarifications must be made in writing and sent to the Library's Architect, Chris Noll chris.noll@nollandtam.com If appropriate, the Library will post responses to bidder questions received at the following address: <https://sonomalibrary.org/about/contracting-opportunities>. The cutoff date for submittal of questions is 3:00 pm July 19th, 2024, local time. Modification of Bids

A bidder may modify its Bid by written communication provided such communication is received by the Library prior to the closing time for receipt of Bids. The written communication should not reveal the Bid price but should state the addition or subtraction or other modification so that the final prices or terms will not be known by the Library until the sealed bid is opened.

10. Withdrawals of Bids

Bids may be withdrawn without prejudice by written or facsimile requests received from bidder prior to the time for opening of Bids, and Bids so withdrawn will be returned to bidders unopened when reached in the process of opening Bids. No bid may be withdrawn after the hour affixed for opening Bids without rendering the accompanying Bid Security subject to retention as liquidated damages in like manner as in the case of failure to execute the Contract after award, as in the

Contract Documents herein provided. Negligence on the part of the bidder preparing its bid shall not constitute a right to withdraw the Bid subsequent to the opening of Proposals.

11. Discrepancies

In the case of discrepancy between unit prices and totals, unit prices will prevail and the Library will recalculate the bid total based on the unit prices and estimated quantities. In case of discrepancy between words and figures, words will prevail. Discrepancies between drawings and specifications, the more stringent will prevail.

12. Equipment Types and Brands Disclosures

Each bidder must furnish evidence before acceptance of bid, names of brands of all major equipment included in the bid. These must be approved prior to awarding the contract.

13. Disqualification of Bidders

(b) More than one Bid from an individual, firm, partnership or corporation under the same or different names will not be considered. Reasonable grounds for believing that any individual, firm, partnership or corporation is interested in more than one Bid for the work contemplated may cause the rejection of all Bids in which the individual, firm, partnership or corporation is interested. If there is reason for believing that collusion exists among the bidders, any or all Bids may be rejected. Bids in which the price is obviously unbalanced may be rejected.

(c) All bidders are put on notice that any collusive agreement fixing the prices to be bid so as to control or affect the awarding of this Contract is in violation of the competitive bidding requirements of the Public Contract Code and may render void any Contract let under such circumstances.

14. Opening & Award of Contract

Bids will be opened publicly and read aloud at the time and date established in the invitation to Bidders. Bid Summaries may be made available to Bidders after the Bid Date.

(a) The Library reserves the right to accept or reject any and all Bids for a period of sixty (60) days after the date of opening, and to waive any informality or irregularity in any Bid. No Bid can be withdrawn during that period, except pursuant to Public Contract Code section 5102, et seq.

(b) The Library reserves the right to reject any or all Bids, including, without limitation, the right to reject any non-conforming, non-responsive, unbalanced, or conditional bids.

(c) Before a Bid is considered for award, the Library may, in addition to the Experience Qualifications form included in the bid documents, require a bidder to submit a statement of facts and detail as to its business, technical organization and financial resources and equipment available and to be used in performing the work. Additionally, the Library may require evidence that the bidder has performed other work of comparable magnitude and type. The Library expressly reserves the right to reject any Bid if it determines that the business and technical organization, equipment, financial and other resources or other experience of the bidder (including the bidder's Subcontractors) is not sufficiently qualified for the work bid upon and, therefore, justifies such rejection.

(d) The award of the Contract, if it is awarded, will be to the lowest responsive responsible bidder whose Bid complies with the requirements set forth herein.

(e) The issuance by the Library of a notice to the successful bidder of the award of the Contract ("Notice of Award") shall be deemed the Award of Contract.

15. Bid Protests

The lack of a prompt procedure to resolve disputes regarding the bidding process would impair the Library's ability to carry out its purpose of constructing this project in a timely manner. Therefore, to the maximum extent authorized by law and notwithstanding any other procedures specified in documents referenced herein, all disputes and/or protests regarding the bidding process shall be subject to the following procedure. In submitting a Bid to the Library for this project, the bidder agrees to comply with and to be bound by this procedure.

Any Bid protest must be submitted in writing to Sonoma County Library, c/o Dave Tichava, 6135 State Farm Drive, Rohnert Park, CA 94928 (Monday through Friday) during the hours of 10:00 a.m. to 4:00 p.m., before 4:00 p.m. on the fifth (5th) working day following Bid opening.

(a) The initial protest document must contain a complete statement of the basis for the protest, and all supporting documentation.

(1) The party filing the protest must have actually submitted a Bid for the Work. A subcontractor of a party submitting a Bid for the Work may not submit a Bid protest. A party may not rely on the Bid protest submitted by another Bidder, but must timely pursue its own protest. protest must refer to the specific portion of the Contract Documents which forms the basis for the protest.

(b) The protest must include the name, address and telephone number of the person representing the protesting party.

(c) The party filing the protest must concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest which may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

(d) The Library will give the protested Bidder five (5) working days after the receipt of the protest to submit a written response. The responding Bidder shall transmit the response to the protesting Bidder concurrent with delivery to the Library.

(e) The procedure and time limits set forth in this paragraph are mandatory and are the Bidder's sole and exclusive remedy in the event of Bid protest. The Bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue the Bid protest, including filing a Government Code Claim or legal proceedings. A Bidder may not rely on a protest submitted by another Bidder, but must timely pursue its own protest.

(f) If the Library determines that a protest is frivolous, the protesting bidder may be determined to be non-responsible and that bidder may be determined to be ineligible for future contract awards.

16. **Contract Bonds**

(a) The successful bidder shall furnish both a Performance Bond and a Payment Bond in the amount of one hundred percent (100%) of its Total Bid Price.

(b) These Bonds shall be furnished in the forms enclosed following the Contract and shall be satisfactory to the Library and shall be obtained from a responsible corporate surety (or sureties) acceptable to the Library, which is admitted by the State of California to act as surety upon bonds and undertakings and which maintains in this State at least one office for the conduct of its business. The surety (or sureties) shall furnish reports as to its financial condition from time to time as requested by the Library. The premiums for said Bonds shall be paid by the successful bidder.

(c) These Bonds shall be furnished by companies who are authorized and licensed by the Insurance Commissioner as an "admitted surety insurer." The surety shall provide the Library with the documentation required by Section 995.660 of the California Code of Civil Procedure.

(d) If any surety becomes unacceptable to the Library or fails to furnish reports as to its financial condition as requested by the Library, the Contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the Library and of persons supplying labor or materials in the prosecution of the work contemplated by this Contract.

(e) In the event of any conflict between the terms of the Contract and the terms of the Bonds, the terms of the Contract shall control and the Bonds shall be deemed to be amended thereby. Without limiting the foregoing, the Library shall be entitled to exercise all rights granted to it by the Contract in the event of default, without control thereof by the surety, provided that the Library gives the surety notice of such default at the time or before the exercise of any such right by the Library, and, regardless of the terms of said Bonds, the exercise of any such right by the Library shall in no manner affect the liability of the surety under said Bonds.

17. **Substitution of Securities for Monies Withheld**

Bidders are hereby notified that in accordance with the provisions of Public Contract Code section 22300, securities may be substituted for any monies which the Library may withhold pursuant to the terms of the Contract to insure performance.

18. **Execution of Contract**

The successful bidder will be notified in writing by the Library of the award of the Contract within sixty (60) days after opening of Bids. Accompanying the Library's Notice of Award will be the Contract, in triplicate, which the successful bidder will be required to execute and return, together with the Performance and Payment Bonds, and the required certificates and policies of insurance together with the required endorsements thereto for the Contractor and the workers compensation certificate to the Library within ten (10) days following receipt of such Notice of Award. Failure to do so shall be just cause for annulment of the award and for forfeiture of the Bid Security which shall be retained as liquidated damages, and it is agreed that the bond sum is a fair estimate of the amount of damages that the Library will sustain by reason of such failure. The Library will promptly determine whether such Contract, Bonds and insurance are as required by the Contract Documents, and upon such determination will forward a fully executed copy of the Contract and a Notice to Proceed with the work to the successful bidder. Signature by both parties constitutes

execution of the Contract. In the event of failure of the lowest responsible bidder to sign and return the Contract with acceptable Bonds and insurance as prescribed herein, the Library may award the Contract to the next lowest responsible bidder, and, in the event that bidder fails to sign and return the Contract with acceptable Bonds and insurance, the Library may award the Contract to the then next lowest responsible bidder, etc.

19. Return of Bid Securities

All Bid Securities will be held until the Contract has been finally executed, after which all Bid Securities, other than any Securities which have been forfeited, will be returned to the respective bidders.

20. Power of Attorney

The Attorney-in-Fact (resident agent) who executes the Performance Bond and Payment Bond on behalf of the surety company must attach a copy of its Power of Attorney as evidence of its authority. A notary shall acknowledge the power as of the date of the execution of the surety bond which it covers.

21. Time of Completion

The time of completion of the work to be performed under this Contract is the essence of the Contract. Delays and extensions of time may be allowed in accordance with the provisions of the General Conditions. The time allowed for the completion of the work is stated in the Contract.

22. Licensing and Registration Requirements for Contractors

All bidders, including general contractors and specialty contractors, shall hold such licenses as may be required by the laws of the State of California for the performance of the work specified in the Contract Documents. All bidders and listed subcontractors must have registered with the California State Department of Industrial Relations pursuant to Labor Code section 1725.5 prior to submitting a bid. Furthermore, all contractors and subcontractors must be registered pursuant to Labor Code section 1725.5 before entering into a contract to work on a public project.

23. Escrow of Bid Documents

Upon award of the job to the successful bidder, and at the time of execution of this Contract, Contractor shall present all documentation used by the successful bidder in arriving at the bid upon which the Contract was awarded ("Bid Documentation") to the Engineer's office. Such documentation shall be presented in a sealed envelope or box. Notice to Proceed will not be granted until Library receives notice that such documentation has been received. This Bid Documentation shall include, but not be limited to any documents, pictures, or writings which relate to, arise out of, or constitute in any way notes, memoranda, phone logs, subcontractor and materialmen estimates, computations, or the like used by, complied by, or drafted by the successful bidder or its agents in arriving at its bid for the Project. The Library Engineer and Project Manager may consult the Bid Documents as needed during the course of the Project and in connection with the resolution of all such disputes. After Project Completion and payment and the resolution of such disputes, the Bid Documents will be returned to the Contractor.

24. Prevailing Wages

Copies of the current schedules for prevailing wages are on file in the Library's office, and the contents of those schedules are included herein as if set forth in full. Copies of the prevailing rate of per diem wages may also be obtained from the Department of Industrial Relations, P.O. Box 420603, San Francisco, CA 94142-0603, Attn: Chief, Division of Labor Statistics and Research or online at: <http://www.dir.ca.gov/oprl/DPreWageDetermination.htm>

25. Preconstruction Conference

A preconstruction conference will be convened after the Contractor has delivered the necessary bonds, insurance certificates and signed agreement in proper form as required in the invitation to bid, bid proposal and general conditions of these specifications. Prior to any work, the Contractor shall provide the Engineer with a list of key personnel assigned to the project and the telephone numbers where they may be reached at any time. The list shall be made available in sufficient copies and presented at the preconstruction conference.

BIDDER'S CHECKLIST

All items on the Bidder's Checklist must be initialed, dated and submitted for the Proposal to be considered complete. The Sonoma County Library reserves the right to award a Contract in a manner and on the basis which will best serve the Library, taking into consideration the information in the statement of Bidder's qualifications and past work history with the Library. The Bidder's attention is especially called to the following forms which must be executed in full as required:

1. a) **BID PROPOSAL**

The total bid price must be shown in the space provided.

Initial: _____ Date: _____

b) **PROPOSAL SIGNATURE SHEET**

To be filled in and signed by the Bidder.

Initial: _____ Date: _____

2. **BID SECURITY ACCOMPANYING BID**

The bid bond is to be executed by the Bidder and the surety company unless bid is accompanied by cash or certified check. The amount of this bond shall be not less than ten percent (10%) of the total amount bid and may be shown in dollars or on a percentage basis.

Initial: _____ Date: _____

3. **NON-COLLUSION DECLARATION**

A Non-Collusion Declaration must be filled out, signed, and submitted with the bid proposal for the bid documents to be considered complete.

Initial: _____ Date: _____

4. **DESIGNATION OF SUBCONTRACTORS**

A Designation of Subcontractors must be filled out and submitted with the bid proposal for the bid documents to be considered complete.

Initial: _____ Date: _____

5. **INSURANCE**

The insurance requirements for this project have been read and understood.

Initial: _____ Date: _____

6. **SITE VISIT (optional)**

The Bidder certifies that it has toured the project site and is familiar with the work involved.

Initial: _____ Date: _____

BIDDERS CHECKLIST CONTINUED

7. **PERFORMANCE AND PAYMENT BONDS**

The Bidder understands that a performance bond issued by an approved surety equaling one hundred percent (100%) of the Contract amount will be required. A payment bond equaling one hundred percent (100%) of the Contract amount will also be required.

Initial: _____ Date: _____

8. **WORK SCHEDULE**

The Library makes no guarantee as to the method of work chosen by the Bidder. It is the Bidder's responsibility to plan and schedule the work in order to complete the work in the time specified in the Special Provisions.

Initial: _____ Date: _____

9. **ADDENDA**

The Bidder acknowledges that it must sign and attach any applicable addenda to the bid proposal.

Initial: _____ Date: _____

10. **WORKERS COMPENSATION**

The Bidder acknowledgment that Worker's Compensation Insurance will be required for this project.

Initial: _____ Date: _____

Proposal to:
Sonoma County Library
c/o : Dave Tichava, Facilities Manager
6135 State Farm Drive
Rohnert Park, CA 94928

BID PROPOSAL

The undersigned Bidder hereby proposes to furnish and deliver all necessary labor, tools, equipment, and other means of construction to perform the work required for the completion of the project entitled “_____ PROJECT” in accordance with the intent of all plans, specifications, and addenda issued by the Sonoma County Library in the amount of:

LUMP SUM BASE BID:

\$

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 ,

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 ,

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 .

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(Place figures in the appropriate boxes.)

SELECTION OF LOW BIDDER

Refer to Instruction to Bidders for selection of apparent low bidder. Additionally, the Library provides notice pursuant to Public Contract Code section 20103.8 that it will utilize the method offered by such section in subsection (b).

Pursuant to such section, the lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items that were specifically identified in the bid solicitation as being used for the purpose of determining the lowest bid price.

ALTERNATES

In order for a Bid to be responsive, Bidder must submit an additive, a deductive bid, or a “no change” bid, for each Alternate listed below. The failure to do so shall result in the Bid being rejected as non-responsive. The failure to quote an amount, unless the bidder marks the “no change” box, will result in the bid being rejected as non-responsive.

The Contract Time will change by the number of days, if any, specified for each accepted Alternate.

Alternate No. 1

Description: _____.

Bid Alternate No 1

If “Add” or “Deduct” is intended, indicate by placing figures in the corresponding boxes. If “No Change” is intended, indicate by marking the “No Change” box

Add \$

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 ,

--	--	--

 ,

--	--	--

 .

--	--

Deduct \$

--

 ,

--	--	--

 ,

--	--	--

 .

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No Change: Bidder will perform this Altnerate without change to Contact Sum.

No extension for time will be granted if this Alternate is accepted.

The Library reserves the right to accept this Alternate within 45 calendar days after the date the Library signs the Agreement.

Alternate No. 2

Description: _____.

Bid Alternate No 2

If "Add" or "Deduct" is intended, indicate by placing figures in the corresponding boxes. If "No Change" is intended, indicate by marking the "No Change" box

Add \$, , .

Deduct \$, , .

No Change: Bidder will perform this Alternate without change to Contract Sum.

No extension for time will be granted if this Alternate is accepted.

The Library reserves the right to accept this Alternate within 45 calendar days after the date the Library signs the Agreement.

Prior to the opening of the bid proposal, the bidder has read the accompanying instructions to Bidders, has carefully examined the location(s) of the proposed work, and has examined all Contract Documents, drawings and addenda issued by the Library and will contract with the Library to construct the project, complete and in satisfactory condition.

- The Bidder further agrees to complete all work required under the Contract within _____ (xxx) working days from the date designated on the Notice to Proceed.
- Accept in full payment therefore the price indicated on the Bid Proposal.

The Bidder acknowledges that it understands that a waiting period from time of bid opening until award may be sixty (60) days during which time Bidder may not withdraw its bid. The Bidder further acknowledges that it has adjusted its bid price to include all possible items which may influence the proposal during the waiting period. Requests for bid price change due to the delay shall not be agreed to by the Library.

Company Name: _____

Bidder's Name (Printed): _____

Bidder's Title: _____

Bidder's Signature: _____

Date: _____

Address:

Phone Number:

Contractor's License Number:

Classification:

Expiration Date:

BID SECURITY

THAT WE, THE UNDERSIGNED, _____, as principal; and _____, as Surety, are hereby held and bound unto the SONOMA COUNTY LIBRARY, hereinafter "Library", in the sum of _____ dollars (\$ _____), which sum is equal to at least ten percent (10%) of the total amount of the bid for the work, payment of which sum, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

The condition of the above obligation is such that whereas the Principal has submitted to the Library a certain Bid, attached hereto and made a part hereof, to enter into a Contract, in writing, for the construction of: **HEALDSBURG REGIONAL LIBRARY MODERNIZATION PROJECT**

NOW, THEREFORE,

- a) If the Bid is rejected, or in the alternative,
- b) If the Bid is accepted and the Principal shall sign and deliver a Contract, in the form of a Contract attached hereto (all completed in accordance with said Bid and Contract), and shall in all other respects perform the agreement created by the acceptance of said Bid;

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

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Library may accept such bid, and said Surety does hereby waive notice of any such extension.

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

IN PRESENCE OF:

(Address) _____

(Address) _____

(Individual Principal) _____

(Business Address) _____

(Individual Principal) _____

(Business Address) _____

Affix

(Corporate Principal) _____

(Business Address) _____

Affix

(Corporate Seal) _____

ATTEST:

(Corporate Surety) _____

(Business Surety) _____

Affix

(Corporate Seal) _____

The rate of premium on this bond is _____ per thousand. Total amount of premium charged \$ _____.

NON-COLLUSION DECLARATION

STATE OF CALIFORNIA)
)
COUNTY OF SONOMA)

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 its 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 it 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 ____[Library], ____[state].

Bidder's Name (Printed): _____

Bidder's Signature: _____
(Same Signature as on Proposal)

Bidder's Title: _____

DESIGNATION OF SUBCONTRACTORS

In compliance with Sections 4100-4114 of the California Public Contract Code each Bidder shall submit the name, contractor license number, and business location of each subcontractor who will perform work or labor or render service to the Contractor for the construction of the work performed under these specifications in excess of one-half (1/2) of one percent (1%) of the prime Contractor's total bid. If the Contractor fails to specify a subcontractor for any portion of the work to be performed under the Contract, it shall be deemed to have agreed to perform such portion itself, and it shall not be permitted to subcontract that portion of the work except under the conditions hereinafter set forth. (Attach additional forms as necessary)

Name Subcontractor	Street Address of Shop, Mill or Office	Types of Work/Category of Contract	\$ Value of Work to be Performed	DIR Registration Number	Subcontractor's License Number/ Type/Exp. Date

If no subcontractors will be used, write "None" here: _____

I declare under penalty of perjury that the foregoing is true and correct and this Declaration is executed this _____ day of _____, 20____, in _____, California.

By: _____

Contractor Company Name: _____

SUBCONTRACTOR FORM MUST BE RETURNED WITH BID

DIVISION 00

PART 2: CONTRACT DOCUMENTS

CONSTRUCTION CONTRACT

THIS CONTRACT made on _____ by and between the Sonoma County Library (“Library”), and _____, hereinafter “Contractor”. The Library and Contractor may be collectively referred to as the “parties”.

The parties have mutually covenanted and agreed as follows:

1. THE CONTRACT DOCUMENTS:

The complete Contract consists of the following documents (“Contract Documents”):

- Invitation to Bid
- Addenda Nos. _____, as issued
- Designation of Subcontractors
- Construction Contract
- Payment Bond to Accompany Contract
- Performance Bond to Accompany Contract
- General Conditions
- Supplementary and Special Conditions (if any)
- Contract Drawings
- Technical Specifications
- Change Orders
- Contractor’s Certification Regarding Workers’ Compensation

2. THE WORK:

The Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, transportation, and material necessary to perform and complete in a good and workmanlike manner, the **HEALDSBURG REGIONAL LIBRARY MODERNIZATION PROJECT** as called for, and in the manner designated in, and in strict conformity with, the Contract Documents. It is understood and agreed that the tools, equipment, apparatus, facilities, labor, transportation, and material shall be furnished and the work performed and completed as required in the Drawings and Specifications under the sole direction and control of the Contractor, and subject to inspection and approval of the Library, or its representatives. The Library hereby designates as its representative for the purpose of this Contract the following named person: Brian Toppel

3. CONTRACT PRICE:

The Library agrees to pay and the Contractor agrees to accept, in full payment for the work above agreed to be done, the sum of [WRITTEN NUMBER] [(NUMBER)] for the Project subject to additions and deductions as provided in the Contract Documents.

4. COMPLETION DATE:

The Project shall be commenced on the date specified in the Notice to Proceed. The total project will be completed within [WRITTEN NUMBER] [(NUMBER)] working days, as defined in the General Conditions, after the date stated in the Notice to Proceed.

5. NOTICE AND SERVICE THEREOF:

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

(a) If the notice is given to the Library, by personal delivery thereof to the Library Director, or by depositing the same in the United States mail, enclosed in a sealed envelope, postage prepaid, and certified; addressed to the Library at:

Sonoma County Library
Attn: Dave Tichava
6135 State Farm Drive
Rohnert Park, CA 94928

With a copy to:
Jeffrey Mitchell
Kronick Moskovitz, Tiedemann & Girard
400 Capitol Mall, 27th Floor
Sacramento, CA 95814

(b) If the notice is given to the Contractor, by personal delivery thereof to said Contractor or to its duly authorized representative at the site of the project, or by depositing the same in the United States mail, enclosed in a sealed envelope, postage prepaid, and certified; addressed to the Contractor at:

Business
Attention:
Street Address
City, State, Zip Code

(c) If the notice is given to the surety or any other person, by personal delivery to such surety or other person, or by depositing the same in the United States mail, enclosed in a sealed envelope, addressed to such surety or other person, as the case may be, at the address of such surety or person last communicated by it to the party giving the notice, postage prepaid and certified.

6. LIQUIDATED DAMAGES:

Liquidated damages as provided for in the General Conditions of the Contract shall be in the sum of One Thousand Dollars (\$1,000.00) for each and every day as defined therein for each different scope of work as defined by the Base Bid and each change order except as otherwise specified in the General Conditions.

7. PREVAILING WAGE:

Copies of the prevailing rate of per diem wages as determined by the Director of the Department of Industrial Relations in accordance with Labor Code section 1773 are on file at the Library, and copies are available for inspection at that office to any interested party on request. Bidders shall be responsible for verifying with the Director of the Department of Industrial Relations that all such

copies of the prevailing rate provided by the Library are current and accurate. The requirement to pay the wage rate so specified is further detailed in the General Conditions.

8. CONTRACTOR REGISTRATION

By the execution of this Contract, Contractor hereby certifies that it is registered with the California Department of Industrial Relations as required pursuant to Labor Code section 1725.5 (contractor registration).

IN WITNESS WHEREOF, four (4) identical counterparts of this Contract, each of which shall for all purposes be deemed an original, have been duly executed by the above-named parties, on the date noted on the first page of this Contract.

Date

Contractor

Date

Erika Thibault, Library Director
Sonoma County Library

Approved as to form:

Jeffrey Mitchell, Library General Counsel

PERFORMANCE BOND

The SONOMA COUNTY LIBRARY, hereinafter "Library," entered into a Contract dated _____, 20__ with _____ hereinafter "Contractor," for the work described as follows:

HEALDSBURG REGIONAL LIBRARY MODERNIZATION PROJECT

WHEREAS, said Contractor is required under terms of said Contract to furnish a bond for the faithful performance of said Contract; and

WHEREAS, the Contract is by reference made a part hereof.

NOW, THEREFORE, we, _____, the undersigned Contractor, as Principal, and _____ (corporate surety), a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the Library in the penal sum of [WRITTEN NUMBER] [(NUMBER)], lawful money of the United States, said sum being not less than one hundred percent (100%) of the total Contract amount, for the payment of which sum 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-bounded Contractor, its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and perform the covenants, conditions, and agreements in said Contract and any alterations thereof made as therein provided, on its 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 Library, 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.

As a condition precedent to the satisfactory completion of said Contract, the above obligation in said amount shall hold good for a period of one (1) year after the completion and acceptance of said work, during which time if the above-bounded Contractor, its heirs, executors, administrators, successors or assigns shall fail to make full, complete, and satisfactory repair and replacements or totally protect the Library from loss or damage made evident during said period of one (1) year from the date of acceptance of said work, and resulting from or caused by defective materials or faulty workmanship in the prosecution of the work done, the above obligation in 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 Contractor remains.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or 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 the specifications. Said Surety hereby waives the provisions of Sections 2819 and 2845 of the Civil Code of the State of California.

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

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

(Contractor as Principal)

(Seal)

By _____

(Seal)

By _____

NOTE: If Contractor is a Partnership, all parties must execute the Bond.

IMPORTANT: Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in California.

PAYMENT BOND

The SONOMA COUNTY LIBRARY, hereinafter "Library," has awarded to _____, hereinafter "Contractor," a Contract for the work described as follows:

HEALDSBURG REGIONAL LIBRARY MODERNIZATION PROJECT

WHEREAS, the Contractor is required by the Contract and by law to furnish a bond in connection with the Contract, as hereinafter set forth.

NOW, THEREFORE, we, _____, the undersigned Contractor, as Principal, and _____, a corporation organized and existing under the laws of the State of _____, duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the _____ in the sum of [WRITTEN NUMBER] [(NUMBER)], said sum being not less than one hundred (100) percent of the total Contract amount payable by the Library, under the terms of the Contract, for which payment well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT, if the Contractor, its heirs, executors, administrators, successors, and assigns or subcontractors shall fail to pay for any materials, provisions, provender or other supplies or teams, implements or machinery used in, upon, for or about the performance of the work contracted to be done, or shall fail to pay for any work or labor thereon of any kind, or shall fail to pay any persons named in Civil Code section 9100, or shall fail to pay for amounts due under the Unemployment Insurance Code with respect to such work or labor thereon of any kind, or shall fail to pay for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Contractor and subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to such work or labor, and provided that the claimant shall have complied with the provisions of that code, the Surety or Sureties hereon will pay for the same in an amount not exceeding the sum specified in the Contract; otherwise, the above obligation shall be void. In case suit is brought upon this bond, the Surety will pay reasonable attorneys' fees to the prevailing party to be fixed by the court.

This bond shall insure to the benefit of any and all persons, companies and corporations entitled to file claims under Section 9100 of the Civil Code, so as to give a right of action to them or to their assigns in any suit brought upon this bond.

It is further stipulated that the Surety of this bond shall not be exonerated or released from the obligation of the bond by any change, extension of time for performance, addition, alteration, or modification in, to, or of any contract, plans, specifications, or agreement pertaining or relating to any scheme or work of improvement described above or pertaining or relating to the furnishing of labor, materials, or equipment therefor, nor by any change or modification of any terms of payment or extension of the time for any payment pertaining or relating to any scheme or work of improvement described above, nor by any rescission or attempted rescission of the Contract, agreement, or bond, nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond, and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given, and under no circumstances shall Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the Library and original contractor or on the party of the obligee named in such bond, but the sole conditions of recovery shall be that claimant is a person described in Sections 8400 and 8402 of the California Civil Code and has not been paid the full

amount of its claim and that Surety does hereby waive notice of any such change, extension of time, addition, alteration, or modification.

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

(Contractor as Principal)

(Seal)

By

(Seal)

By

NOTE: If Contractor is a Partnership, all partners should execute Bond.

IMPORTANT: Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in California.

CONTRACTOR'S CERTIFICATE REGARDING WORKER'S COMPENSATION

TO: Dave Tichava, Facilities Manager
Sonoma County Library
6135 State Farm Drive
Rohnert Park, CA 94928

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

(Contractor)

By _____

(Business Address)

(Place of Residence)

INSURANCE REQUIREMENTS FOR CONTRACTORS

Contractor shall procure and maintain for the duration of the Contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, its agents, representatives, employees or subcontractors.

Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office Commercial General Liability coverage (occurrence form CG 0001).
2. Insurance Services Office form number CA 0001 (Ed. 1/87) covering Automobile Liability, code 1 (any auto).
3. Workers' Compensation insurance as required by the State of California and Employer's Liability Insurance.

Minimum Limits of Insurance

Contractor shall maintain limits no less than:

1. General Liability: \$2,000,000 per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.
2. Automobile Liability: \$2,000,000 per accident for bodily injury and property damage.
3. Employer's Liability: \$2,000,000 per accident for bodily injury or disease.

Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the Library. At the option of the Entity, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the Entity, its officers, officials, employees and volunteers; or the Contractor shall provide a financial guarantee satisfactory to the Entity guaranteeing payment of losses and related investigations, claim administration and defense expenses.

Other Insurance Provisions

The automobile liability and general liability policies are to contain, or be endorsed to contain, the following provisions:

1. The Entity, its officers, officials, employees, and volunteers are to be covered as insureds with respect to liability arising out of automobiles owned, leased, hired or borrowed by or on behalf of the Contractor; and with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts or equipment furnished in connection with such work or operations. General liability coverage can be provided in the form of an endorsement to the Contractor's insurance, or as a separate owner's policy.
2. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance as respects the Entity, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the Entity, its officers, officials, employees or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.
3. Each insurance policy required by the clause shall be endorsed to state that coverage shall not be canceled by either party, except after thirty (30) days prior to written notice by certified mail, return receipt requested, has been given to the Entity.

Acceptability for Insurers

Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII.

Verification of Coverage

Contractor shall furnish the Entity with original certificates and amendatory endorsements effecting coverage required by this clause. The endorsements should be on forms provided by the Entity or on other than the Entity's forms, provided those forms or policies are approved by the Entity and amended to conform to the Entity's requirements. All certificates and endorsements are to be received and approved by the Entity before work commences. The Entity reserves the right to require complete, certified copies of all required insurance policies, including endorsements effecting the coverage required by these specifications at any time.

Subcontractors

Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

GENERAL LIABILITY SPECIAL ENDORSEMENT

FOR SONOMA COUNTY LIBRARY (the "Entity")

ENDORSEMENT NO:

ISSUE DATE:

PRODUCER

POLICY INFORMATION:

Insurance Company:

Policy No.:

Policy Period : (from) _____ (to) _____

LOSS ADJUSTMENT EXPENSE Included in Limits
 In Addition to Limits

Deductible Self-Insured Retention (check which) of \$ _____
 with an Aggregate of \$ _____ applies to _____
 coverage. Per Occurrence Per Claim

Telephone _____

NAMED INSURED

APPLICABILITY. This insurance pertains to the operations and/or tenancy of the named insured under all written agreements and permits in force with the Entity unless checked here in which case only the following specific agreements and permits with the Entity are covered:
 ENTITY AGREEMENTS/PERMITS: _____

TYPE OF INSURANCE

COMMERCIAL GENERAL LIABILITY Claims Made
 COMPREHENSIVE GENERAL LIABILITY Retroactive Date _____
 OWNERS & CONTRACTORS PROTECTIVE Occurrence

OTHER PROVISIONS

COVERAGES

GENERAL
 PRODUCTS COMPLETED OPERATIONS
 PERSONAL & ADVERTISING INJURY
 FIRE DAMAGE

LIABILITY LIMIT IN THOUSANDS
 EACH OCCURRENCE AGGREGATE

CLAIMS: Underwriter's representative for claims pursuant to this insurance

Name: _____
 Address _____
 Telephone (_____) _____

In consideration of the premium charged and notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any endorsement now or hereafter attached thereto, it is agreed as follows:

1. **INSURED.** The Entity, its elected or appointed officers, agents, volunteers and employees are included as additional insured with regard to liability and defense of suits arising from the operations, products and activities performed by or on behalf of the named insured.
2. **CONTRIBUTION NOT REQUIRED.** As respects: (a) work performed by the Named Insured for or on behalf of the Entity; or (b) products sold by the Named Insured to the Entity; or (c) premises leased by the Named Insured from the Entity, the insurance afforded by this policy shall be primary insurance as respects the Entity, its elected or appointed officers, officials, employees or volunteers; or stand in an unbroken chain of coverage excess of the Named Insured's scheduled underlying primary coverage. In either event, any other insurance maintained by the Entity, its elected or appointed officers, officials, employees or volunteers shall be in excess of this insurance and shall not contribute with it.
3. **SEVERABILITY OF INTEREST.** This insurance applies separately to each insured against whom claim is made or suit is brought except with respect to the company's limits of liability. The inclusion of any person or organization as an insured shall not affect any right which such person or organization would have as a claimant if not so included.
4. **CANCELLATION NOTICE.** With respect to the interests of the Entity, this insurance shall not be canceled, or materially reduced in coverage or limits excepts after thirty (30) days prior written notice by receipted delivery has been given to the Entity.
5. **PROVISIONS REGARDING THE INSURED'S DUTIES.** Any failure to comply with reporting provisions of the policy or breaches or violations of warranties shall not affect coverage provided to the Entity, its elected or appointed officers, officials employees or volunteers.
6. **SCOPE OF COVERAGE.** This policy, if primary, affords coverage at least as broad as:
 - (1) Insurance Services Office Commercial General Liability Coverage, "occurrence" form CG 0001; or
 - (2) If excess, affords coverage which is at least as broad as the primary insurance form CG 0001.

Except as stated above nothing herein shall be held to waive, alter or extend any of the limits conditions, agreements or exclusions of the policy to which this endorsement is attached.

ENDORSEMENT HOLDER

ENTITY

Sonoma County Library
 Attn: Dave Tichava, Library Director
 6135 State Farm Drive
 Rohnert Park, CA 94928

AUTHORIZED REPRESENTATIVE

Broker/Agent Underwriter _____
 I _____ (print/type name), warrant that I have authority to bind the above-mentioned insurance company and by my signature hereon do so bind this company to this endorsement.
 Signature _____
 (ORIGINAL SIGNATURE REQUIRED)
 Telephone: (_____) _____ Date Signed _____

SUBMIT IN DUPLICATE

AUTOMOBILE LIABILITY SPECIAL ENDORSEMENT

FOR SONOMA COUNTY LIBRARY (the "Entity")

ENDORSEMENT NO:

ISSUE DATE:

PRODUCER

Telephone

POLICY INFORMATION:

Insurance Company:

Policy No.:

Policy Period : (from)

(to)

LOSS ADJUSTMENT EXPENSE

Included in Limits

In Addition to Limits

Deductible Self-Insured Retention (check which) of \$ _____

with an Aggregate of \$ _____ applies to _____

coverage. Per Occurrence Per Claim

NAMED INSURED

APPLICABILITY. This insurance pertains to the operations and/or tenancy of the named insured under all written agreements and permits in

force with the Entity unless checked here in which case only the following specific agreements and permits with the Entity are covered:

ENTITY AGREEMENTS/PERMITS:

TYPE OF INSURANCE

COMMERCIAL AUTO POLICY

BUSINESS AUTO POLICY

OTHER

OTHER PROVISIONS

LIMIT OF LIABILITY

\$ _____
per accident, for bodily injury and property damage

CLAIMS: Underwriter's representative for claims pursuant to this insurance

Name: _____

Address: _____

Telephone _____

()

In consideration of the premium charged and notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any endorsement now or hereafter attached thereto, it is agreed as follows:

1. **INSURED.** The Entity, its elected or appointed officers, agents, volunteers and employees are included as additional insured with regard to liability and defense of suits arising from the operations, products and activities performed by or on behalf of the named insured.
2. **CANCELLATION NOTICE.** With respect to the interests of the Entity, this insurance shall not be canceled, or materially reduced in coverage or limits except after thirty (30) days prior written notice by receipted delivery has been given to the Entity.
3. **PROVISION REGARDING THE INSURED'S DUTIES.** Any failure to comply with reporting provisions of the policy or breaches or violations of warranties shall not affect coverage provided to the Entity, its elected or appointed officers, officials, employees or volunteers.
4. **SCOPE OF COVERAGE.** This policy, if primary, affords coverage at least as broad as:
 - (1) If excess, affords coverage which is at least as broad as the primary insurance form CG 0001.

Except as stated above nothing herein shall be held to waive, alter or extend any of the limits conditions, agreements or exclusions of the policy to which this endorsement is attached.

ENDORSEMENT HOLDER

ENTITY

Sonoma County Library
Attn: Dave Tichava, Facilities Manager
6135 State Farm Drive
Rohnert Park, CA 94928

AUTHORIZED

REPRESENTATIVE

Broker/Agent

Underwriter

I _____ (print/type name), warrant that I have authority to bind the above-mentioned insurance company and by my signature hereon do so bind this company to this endorsement.

Signature _____

(ORIGINAL SIGNATURE REQUIRED)

Telephone: ()

Date Signed

SUBMIT IN DUPLICATE			
<p>WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY SPECIAL ENDORSEMENT</p> <p>FOR SONOMA COUNTY LIBRARY (the "Entity")</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">ENDORSEMENT NO:</td> <td style="width: 50%; padding: 5px;">ISSUE DATE:</td> </tr> </table>	ENDORSEMENT NO:	ISSUE DATE:
ENDORSEMENT NO:	ISSUE DATE:		
<p>PRODUCER</p> <p>Telephone _____</p>	<p>POLICY INFORMATION:</p> <p>Insurance Company: _____</p> <p>Policy No.: _____</p> <p>Policy Period : (from) _____ (to) _____</p>		
<p>NAMED INSURED</p>	<p>OTHER PROVISIONS</p>		
<p>CLAIMS: Underwriter's representative for claims pursuant to this insurance</p> <p>Name: _____</p> <p>Address: _____</p> <p>Telephone(_____) _____</p>	<p>EMPLOYERS LIABILITY LIMITS</p> <p>\$ _____ (Each Accident)</p> <p>\$ _____ (Disease -Policy Limit)</p> <p>\$ _____ (Disease - Each Employee)</p>		
<p>In consideration of the premium charged and notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any endorsement now or hereafter attached thereto, it is agreed as follows:</p> <ol style="list-style-type: none"> 1. CANCELLATION NOTICE. This insurance shall not be canceled, or materially reduced in coverage or limits except after thirty (30) days prior written notice by receipted delivery has been given to the Entity. 2. WAIVER OF SUBROGATION. The Insurance Company agrees to waive all rights of subrogation against the Entity, its elected or appointed officials, agents and employees for losses paid under the terms of this policy which arise from the work performed by the Named Insured for the Entity. <p>Except as stated above nothing herein shall be held to waive, alter or extend any of the limits conditions, agreements or exclusions of the policy to which this endorsement is attached.</p>			
<p>ENDORSEMENT HOLDER</p>			
<p>ENTITY</p> <p>Sonoma County Library Attn: Dave Tichava, Facilities Manager 6135 State Farm Drive Rohnert Park, CA 94928</p>	<p>AUTHORIZED REPRESENTATIVE <input type="checkbox"/> Broker/Agent <input type="checkbox"/> Underwriter <input type="checkbox"/> _____</p> <p>I _____ (print/type name), warrant that I have authority to bind the above-mentioned insurance company and by my signature hereon do so bind this company to this endorsement.</p> <p>Signature _____ (ORIGINAL SIGNATURE REQUIRED)</p> <p>Telephone: (_____) _____ Date Signed _____</p>		

**CERTIFICATE OF INSURANCE
FOR SONOMA COUNTY LIBRARY (the "Entity")**

ISSUE DATE (MM/DD/YY)

PRODUCER

THIS CERTIFICATE OF INSURANCE IS NOT AN INSURANCE POLICY AND DOES NOT AMEND, EXTEND, OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED

	COMPANIES	BEST'S RATING
COMPANY LETTER A	_____	_____
COMPANY LETTER B	_____	_____
COMPANY LETTER C	_____	_____
COMPANY LETTER D	_____	_____
COMPANY LETTER E	_____	_____

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED TO MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL TERMS, EXCLUSIONS, AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LET	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	ALL LIMITS IN THOUSANDS	
	GENERAL LIABILITY [] COMMERCIAL GENERAL LIABILITY [] CLAIMS MADE [] OCCUR [] OWNER'S & CONTRACTOR'S PROT. [] OTHER _____				GENERAL AGGREGATE	\$ _____
					PRODUCTS-COMP/OPS AGGREGATE	\$ _____
					PERSONAL & ADVERTISING INJURY	\$ _____
					EACH OCCURRENCE	\$ _____
					FIRE DAMAGE (any one fire)	\$ _____
					MEDICAL EXPENSE (Any on person)	\$ _____
	AUTOMOBILE LIABILITY [] ANY AUTO [] ALL OWNED AUTOS [] SCHEDULED AUTOS [] HIRED AUTOS [] NON-OWNED AUTOS [] GARAGE LIABILITY				COMBINED SINGLE LIMIT	\$ _____
					BODILY INJURY (PER PERSON)	\$ _____
					BODILY INJURY (PER ACCIDENT)	\$ _____
					PROPERTY DAMAGE	\$ _____
	EXCESS LIABILITY [] UMBRELLA [] OTHER THAN UMBRELLA FORM				EACH OCCURRENCE	\$ _____
	[] WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY				AGGREGATE	\$ _____
					STATUTORY	\$ _____
					EACH ACCIDENT	\$ _____
					DISEASE - POLICY LIMIT	\$ _____
					DISEASE - EACH EMPLOYEE	\$ _____
	PROPERTY INSURANCE [] COURSE OF CONSTRUCTION				AMOUNT OF INSURANCE	\$ _____

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/RESTRICTIONS/SPECIAL ITEMS
PARKSIDE PEDESTRIAN ROUTE IMPROVEMENTS – PHASE 2

THE FOLLOWING PROVISIONS APPLY:

- None of the above-described policies will be canceled until 30 days' written notice has been given to the Entity at the address indicated below.
- The Entity, its officials, officers, employees and volunteers are added as insured on all liability insurance policies listed above.
- It is agreed that any insurance or self-insurance maintained by the Entity will apply in excess of and not contribute with, the insurance described above.
- The Entity is named as loss payee on the property insurance policies described above, if any.
- All rights of subrogation under the property insurance policy listed above have been waived against the Entity.
- The workers' compensation insurer named above, if any, agrees to waive all rights of subrogation against the Entity for injuries to employees of the insured resulting from work for the Entity or use of the Entity's premises or facilities.

CERTIFICATE INSURED (ENTITY)

Sonoma County Library
Attn: Dave Tichava, Facilities Manager
6135 State Farm Drive
Rohnert Park, CA 94928

AUTHORIZED REPRESENTATIVE

SIGNATURE _____
TITLE _____
PHONE NO. _____

THIS ENDORSEMENT CHANGES THE POLICY, PLEASE READ IT CAREFULLY.

Insurer:
Policy No.:
Endorsement:

ADDITIONAL INSURED

OWNERS, LESSEES OR CONTRACTORS (FORM B)

THIS ENDORSEMENT CHANGES THE POLICY, PLEASE READ IT CAREFULLY.

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART.

SCHEDULE

Name of Organization

(If no entry appears above, the information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

WHO IS AN INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of "your work" for that insured by or for you.

Modifications to ISO form CG 20 10 11 85:

1. The insured scheduled above includes the Insured's officers, officials, employees, and volunteers.
2. This insurance shall be primary as respects the insured shown in the schedule above, or if excess, shall stand in an unbroken chain of coverage excess of the Named Insured's scheduled underlying primary coverage. In either event, any other insurance maintained by the Insured scheduled above shall be in excess of this insurance and shall not be called upon to contribute with it.
3. The insurance afforded by this policy shall not be canceled except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the Entity.

Signature-Authorized Representative

Address

DIVISION 00

PART 3: GENERAL CONDITIONS

PART 3: GENERAL CONDITIONS

SECTION 1

DEFINITIONS AND TERMS

1.01. GENERAL

Wherever the following abbreviations and terms, or pronouns in place of them, are used in these Conditions and other Contract Documents of which these Conditions are a part, the intent and meaning shall be interpreted as provided below.

1.02. ABBREVIATIONS

The following abbreviations may be used in the Contract Documents:

AASHTO	American Association of State Highway/Transportation Officials
ASTM	American Society for Testing and Materials
OSHA	Occupational Safety and Health Act of 1970

1.03. NOT USED

1.04. DEFINITIONS

The intent and meaning of the following, wherever they appear in the Contract Documents, shall be interpreted as follows:

Acceptance - The formal acceptance by the Engineer of the entire Contract, which has been completed in all respects in accordance with the Specifications and any, approved modifications.

Addenda - Any written change, clarification or supplement to documents issued for bidding, issued by the Library or its Engineer prior to bid.

Architect – The Architect designated by the Library as its architectural representative during the course of construction, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

As Approved - The words “as approved”, unless otherwise qualified, shall be understood to be followed by the words “by the Engineer”.

As Shown, and As Indicated - The words “as shown” and “as indicated” shall be understood to be followed by the words “on the Plans”.

Award - The decision of the Library Commission to accept the proposal of the lowest responsible bidder for the Work, subject to the execution and approval of a satisfactory contract therefore and bond to secure the performance thereof and to such other conditions as may be specified or required by law.

Bid - The offer of the bidder for the Work when made out and submitted on the prescribed bid form, properly signed and guaranteed. A Bid is also known as a Proposal.

Bid Security - The cash, cashier's check, certified check, or bidder's bond accompanying the bid submitted by the bidder, as a guarantee that the bidder will enter into a Contract with the Library for the performance of Work herein described.

Bidder - Any individual, firm, partnership or corporation submitting a bid for the Work contemplated, and acting directly or through a duly authorized representative.

Bureau - United States Bureau of Reclamation.

Calendar Day - Each day shown on the calendar.

Change Order - Written order issued by the Library to the Contractor covering changes in the Contract and establishing the bases of compensation and time adjustments for work affected by the changes.

Claim - A separate demand by the contractor for (i) a time extension, (ii) 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 (iii) an amount the payment of which is disputed by the Library.

Contract - The written agreement covering the performance of the work and the furnishing of labor, materials, tools and equipment in the construction of the Work. The Contract shall include all Contract Documents and supplemental agreements amending or extending the work contemplated which may be required to complete the Work in a substantial and acceptable manner. Supplemental agreements are written agreements covering alterations, amendments, or extensions to the contract and include addenda and change orders.

Contract Documents - Contract Documents is the collective term for all of the following documents and any other document incorporated therein by reference: Invitation to Bid, Accepted Bid, Designation of Subcontractors, Construction Contract, Payment Bond to Accompany Contract, Performance Bond to Accompany Contract, General Conditions, Supplementary and Special Conditions, (if any), Drawings (and Specifications), Addenda, Change Orders, Contractor's Certification Regarding Workers' Compensation.

Contract Provisions – Additions, revisions, special directions, and requirements peculiar to a project and not otherwise thoroughly set forth in General and/or Specifications.

Contractor - The person or persons, firm, partnership or corporation or other entity who has entered into the Contract with the Library to perform the Work.

County - County of Sonoma, California.

Date of Completion - Date of filing of the Notice of Completion with the Sonoma County Clerk-Recorder's Office.

Date of Execution of the Contract - The date on which the Contract is signed by the Library's authorized representative.

Datum - The Figures given in the Specifications or upon the drawings after the word "Elevation" or an abbreviation of it, shall mean U.S.G.S. datum, unless otherwise noted.

Days - Unless otherwise designated, days as used in the Contract Documents shall mean calendar days.

Library - The Sonoma County Library, also referred to as the Owner.

Library Commission - The Commission of the Sonoma County Library.

Elevation - The figures given on the Plans or in the other Contract Documents after the word “elevation” or abbreviation of it shall mean the distance in feet above the standard datum used by the Library.

Engineer - The Library Engineer, or the person designated by the Library as its engineering representative during the course of construction, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

Extra Work - Work other than that required either expressly or implied by the Contract in its executed form.

Notice of Completion – NOC is the recorded project completion document filed with the Sonoma County Clerk

Or Equal - The term “or equal” shall be understood to indicate that the “equal” product be the equivalent or better than the product named in function, performance, reliability, quality, and general configuration. Determination of equality in reference to the project design requirements will be made by the Engineer.

Plans or Specification Drawings - The term “Plans” or “Specification Drawings” refers to the official plans, profiles, cross sections, elevations, details, and other working drawings and supplementary drawings, or reproductions thereof, signed by the Engineer, which show the location, character, dimensions, and details of the work to be performed. Plans may either be bound in the same book as the balance of the Contract Documents or bound in separate sets. Regardless of the method of binding, Plans shall be part of the Contract Documents.

Plant - All physical, resources, facilities, machinery, equipment, staging, tools, work and storage space other than provided by the Contract, together with subsidiary essentials and necessary maintenance for proper construction and acceptable completion of the project.

Project - The entire Work to be completed under the Contract.

Project Manager - The person designated by the Library as its project management representative during the course of construction, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them. The Project Manager will be the Library’s Agent unless the Library designates a separate Project Manager. When a Project Manager is used for a project, the Project Manager has full authority to act as the Library’s Agent unless the designation specifically states otherwise.

Shop Drawings - Drawings prepared by the fabricator or supplier showing the layout and details of components fabricated in a shop for inclusion in the permanent facility (e.g., structural steel, reinforcing steel, railings).

Site - The area upon or in which the Contractor’s operations are carried on and such other areas adjacent thereto as may be designated by the Architect.

Specifications - The term “specifications” refers to the terms, provisions, and requirements contained herein. Where reference specifications, such as those of “ASTM”, “AASHTO”, etc.

have been referred to, the applicable portions of such standard specifications shall become a part of these Contract Documents.

State - State of California.

Subcontractor - The term "Subcontractor", as employed herein, includes only those having a direct contract with the Contractor and it includes one who furnishes material worked to a special design according to the plans or specifications of this work, but does not include one who merely furnishes material not so worked and would be considered a supplier only.

Time Limits - All time limits stated in the Contract Documents are of the essence of the Contract.

Work - All the work specified, indicated, shown or contemplated in the Contract Documents to construct the improvements, including all alterations, amendments or extensions thereto made by Change Order or other written orders of the Engineer.

Working Days – A Working day is defined as any day, except Saturdays, Sundays and legal holidays of the Library.

Working Drawings – Drawings furnished by the Contractor showing the layout and details of temporary construction procedures and methods of construction, and data for construction equipment which are to be employed in the construction of the permanent facility (e.g., form drawings, erection drawings, load test pile procedures, pile hammer data, etc.).

Written Notice - "Written Notice" shall be deemed to have been duly served when delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by certified U.S. mail to the last business address known to the party who gives the notice as specified in the Contract.

Whenever in the Specifications or upon the drawings the words "directed", "required", "permitted", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation or prescription of the Engineer is intended, and similarly the words "approved", "acceptable", "satisfactory", or words of like import, shall mean approved or acceptable to, or satisfactory to the Architect, unless otherwise expressly stated.

SECTION 2

SCOPE OF WORK

2.01. INTENT OF CONTRACT DOCUMENTS

The intent of the Contract Documents is to prescribe the details for the construction and completion of the Work, which the Contractor undertakes to perform in accordance with the terms of the Contract.

Where the Specifications and Plans describe portions of the Work in general terms, but not in complete detail, it is understood that only the best general practice is to prevail and that only materials and workmanship of the first quality are to be used. Unless otherwise specified, the Contractor shall furnish all labor, materials, tools, equipment and incidentals and do all the Work involved in performing the Contract in a satisfactory and workmanlike manner.

The technical provisions are presented in sections for convenience. However, this presentation does not necessarily delineate trades or limits of responsibility. All sections of the Specifications and Plans are interdependent and applicable to the Project as a whole.

The Contract Documents are complementary, and what is called for in any one shall be as binding as if called for in all. Anything shown on the Drawings and not mentioned in the Specifications or mentioned in the Specifications and not shown on the Drawings shall have the same effect as if shown or mentioned respectively in both. Any work shown on one Drawing shall be construed to be shown in all Drawings and the Contractor will coordinate the Work and the Drawings.

If any portion of the Contract Documents shall be in conflict with any other portion, the various documents comprising the Contract Documents shall govern in the following order of precedence: Change Orders; Addenda; Drawings, Supplementary and Special Conditions; Designation of Subcontractors; Construction Contract; General Conditions; Payment Bond to Accompany Contract; Performance Bond to Accompany Contract; and Contractor's Certification Regarding Workers' Compensation.

Detail Drawings take precedence over General Drawings. As between schedules and other information given on Drawings, the Schedules shall govern. If an item is shown on any Drawing and not specifically included in Technical Specifications specific to this project, the Drawing shall govern. Any conflict or inconsistency between or in the drawings shall be submitted to the Architect for clarification as soon as the Contractor becomes aware of such inconsistency.

2.02. CONTRACTOR'S UNDERSTANDING

It is understood and agreed that the Contractor has, by careful examination, satisfied itself as to the nature and location of the Work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the Work, the general and local conditions, and all other matters which can in any way affect the Work under this Contract. No verbal agreement or conversation with any officer, agent or employee of the Library, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations contained herein.

2.03. CHANGES IN THE WORK

(a) The Library may, at any time, by written order, make changes in the Work as deemed necessary by the Architect. Such changes include, but are not limited to:

- (1) In the Specifications or Plans;
- (2) In the sequence, method or manner of performance of the Work;
- (3) In the owner-furnished facilities, equipment, materials, services or site;
and
- (4) Directing acceleration of the Work.

(b) If such changes cause an increase or decrease in the Contractor's cost of, or time required for, performance of the Contract, an equitable adjustment will be made and the Contract modified in writing accordingly.

(1) Change Orders

A change pursuant to this section will be in the form of a Change Order, which will set forth the work to be done or the method by which the change and cost adjustment, if any, will be determined, and the time of completion of the work.

Upon receipt of a Change Order, the Contractor shall proceed with the ordered work. If ordered in writing by the Library, the Contractor shall proceed with the work so ordered prior to actual receipt of a Change Order. A Change Order executed by the Contractor and approved by the Library is an executed Change Order as that term is used throughout this section.

(2) Change Order Protests

A Change Order may be issued to the Contractor at any time. Should the Contractor disagree with any terms or conditions set forth in a Change Order, which he has not executed, he shall submit a written protest to the Library within fifteen (15) days after the receipt of such Change Order. The protest shall state the points of disagreement and, if possible, the quantities and cost involved.

If a written protest is not submitted, payment will be made as set forth in the Change Order. Such payment shall constitute full compensation for all work included therein or required thereby. Such unprotested Change Orders shall be considered as executed Change Orders.

Where the protest concerning a Change Order relates to compensation, the compensation payable for all work specified or required by said Change Order to which such protest relates will be determined in the same manner as provided in Section 2.04. The Contractor shall keep full and complete records of the cost of such work and shall permit the Library to have such access thereto as may be necessary to assist in the determination of the compensation payable for such work. Where the protest concerning a Change Order relates to the adjustment of time and for completion of the Work, the time to be allowed therefor will be determined as provided in this section.

The consent of the Contractor's sureties shall not be required as to any change or Extra Work, and the liability of the Contractor's Bonds shall be increased or decreased accordingly without notice to the sureties.

2.04. PROCEDURES AND ALLOWABLE COSTS ON CHANGES AND ADDITIONS TO WORK

(a) Forms of Payment

If the change in, or addition to, the Work will result in an increase in the contract sum, the Library shall have the right to require the performance thereof. The compensation to be paid for any such work shall, in the Library's sole discretion, be determined in one or more of the following ways:

- (1) By extension of agreed unit prices, if unit prices are required by the Library's bid form and provided with contractor's bid;
- (2) By revision of unit prices;
- (3) By proposal and acceptance of an agreed upon lump sum; and
- (4) On a force account basis.

Until one of the above methods is agreed on, or if the Work is to be paid for on a time and materials basis, the Contractor shall keep full and complete records of the cost of such work in the form and manner prescribed by the Library and shall permit the Library to have access to such records as may be necessary to assist in the determination of the compensation payable for such work.

(b) Lump Sum Payment

The Library, in its sole and absolute discretion, may request a lump sum proposal by Contractor to perform the change in, or addition to, the Work performed. Such lump sum proposal shall be submitted by the Contractor within ten (10) days of the Library's request therefor. Request for a lump sum proposal by Library shall not be deemed an election by Library to have the Work performed on a lump sum basis. Costs of preparing the proposal shall not be compensable.

- (1) Contents of Lump Sum Proposal
- (2) The Contractor's proposal shall be itemized and segregated by labor and materials for the various components of the change (no aggregate labor total will be acceptable). The proposal shall be accompanied by signed proposals of any Subcontractors, which will perform any portion of the change, and of any persons who will furnish materials or equipment for incorporation therein. The proposal shall also include the Contractor's estimate of the time required to perform said changes or additional work.
- (3) Computation of Labor Costs

The portion of the proposal relating to labor, whether by the Contractor's forces or the forces of any of its Subcontractors, may include the projected wages of the reasonably anticipated Site labor, including

foremen, who will be directly involved in the change in the Work. These projected wages shall not include charges for assistant superintendents, superintendents, office personnel, timekeepers and maintenance mechanics.

Labor costs may also include Contractor's overhead and profit which shall be computed by adding to the labor costs either up to fifteen percent (15%) of the projected wages, but not payroll costs, or the labor surcharge set forth in the California Department of Transportation publication entitled Labor Surcharge And Equipment Rental Rates, which is in effect on the date upon which the Work is accomplished and which is a part of the Contract. The method of computing the overhead and profit shall be solely within the discretion of the Library.

The labor surcharge, if used, shall constitute full compensation for all payments imposed by State and Federal laws and for all other payments made to, or on behalf of, the workmen, other than actual wages as defined above. No time or charges will be allowed except when the workers are actually engaged in the proper, efficient and diligent performance or completion of the extra work as authorized. Overtime shall not be worked without prior approval of the Engineer.

(4) Computation of Equipment and Materials Costs

The portion of the proposal relating to materials may include the reasonably anticipated direct costs to the Contractor or to any of its Subcontractors of materials to be purchased for incorporation in the change in the Work. This portion of the proposal may also include transportation and applicable sales or use taxes. Up to fifteen percent (15%) of these direct costs may be included as overhead and profit for the Contractor or any such Subcontractor (such overhead and profit to include all small tools).

This portion of the proposal may further include the Contractor's and any of its Subcontractors' reasonably anticipated costs for the rental and operation of prime construction and automotive equipment furnished and used in connection with the change in the Work. The equipment rental and operation rates used shall be the latest edition of the Department of Transportation, Division of Construction, Equipment Rental Rates. These costs shall not include charges for listed equipment or major tools with a new cost of five hundred dollars (\$500) or less. No time charges shall be allowed except for equipment actually used for the proper and efficient performance or completion of the authorized change in the Work.

(5) Subcontractors

The lump sum proposal may include up to five percent (5%) of the amount, which the Contractor will pay to any of its Subcontractors for the change in the Work as allowable overhead and profit to the Contractor.

(6) Failure to Submit Lump Sum Proposal

In the event that the Contractor fails to submit its proposal within the designated period, the Library may direct the Contractor to proceed with the change or addition to the Work and the Contractor shall so proceed. The Library shall unilaterally determine the reasonable costs and time to perform the work in question, which determination shall be final and binding upon the Contractor.

(7) Failure to Agree on Lump Sum Amount

In the event that the parties are unable to agree as to the reasonable costs and time to perform the change in or addition to the Work based upon the Contractor's proposal and the Library's Representative and Library do not elect to have the change in the Work performed on a time and material basis, the Library's Representative and Library shall make a unilateral determination of the reasonable cost and time to perform the change in the Work, based upon their own estimates, the Contractor's submission or combination thereof. In such instances, a Change Order shall be issued for the amount of costs and time determined by the Library's Representative and the Library and shall become binding upon the Contractor unless the Contractor submits its protest in writing to the Library within thirty (30) days of the issuance of the Change Order. The Library has the right to direct the Contractor in writing to perform the change in the Work, which is the subject of the Change Order. Failure of the parties to reach agreement regarding the costs and time of performing the change in the Work and/or any pending protest shall not relieve the Contractor from performing the change in the Work promptly and expeditiously.

(c) Payment by Unit Prices

If any of the items included in the lump sum proposal are covered by unit prices contained in the contract document, the Library may, if it requires the change in the Work to be performed on a lump sum basis, elect to use these unit prices in lieu of the similar items included in the lump sum proposal in which event an appropriate deduction will be made in the lump sum amount prior to the application of any allowed overhead and profit percentages. No overhead and profit shall be applied to any unit prices.

(d) Payment on a Force Account Basis

If the Library elects to have the change or addition to the Work performed on a force account basis, the Work shall be performed, whether by the Contractor's forces or the forces of any of its Subcontractors or Sub-subcontractors, and payment shall be made subject to the following provision. The Contractor will be paid the direct costs of the labor, equipment and materials used in performing the force account work determined as hereinafter provided.

- (1) For labor, the Contractor will be paid the cost of labor for the workers (including foremen when authorized by the Library's Representative) used in the actual and direct performance of the work. The cost of labor, whether the employer is the Contractor or any or any subcontractor of any tier, shall be actual wages, including basic hourly wage, health and welfare payments and pension payments incurred in performing the force account work, plus any travel and subsistence payments for the workers

performing such work and made necessary thereby. To the actual wages shall be added a labor surcharge as set forth in the State Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates", as in effect on the date the work is performed. The labor surcharge shall be deemed to encompass the Library's entire liability to reimburse the Contractor for workers compensation insurance payments, social security payments, Medicare payments, federal unemployment insurance payments, state unemployment insurance payments and state training taxes, made necessary by the force account work.

- (2) For equipment, the Contractor will be paid for the use of equipment at the rental rates listed for that equipment in the State Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates", which is in effect on the date the work is performed, regardless of ownership or any rental agreement entered into by Contractor for such equipment. The rental rate paid in accord with said publication shall be deemed to include the cost of fuel, oil, lubrication, supplies, small tools, attachments, repairs and maintenance, depreciation, storage and insurance for said equipment. Rental time will not be paid when equipment is inoperable due to breakdowns, repairs or maintenance.
- (3) For materials used in the work, the Library will pay for materials furnished by the Contractor and necessarily used in the force account work. Prior to markups as set forth below, the amount paid shall be the price paid by the actual purchaser to the actual supplier plus any necessary actual costs of handling the materials.

Contractor may add fifteen percent (15%) to the total labor, equipment and material charges as the total overhead and profit to the entity or entities actually performing the force account work. If the entity or entities actually performing the work are Subcontractors or Sub-subcontractors, the Contractor shall be allowed five percent (5%) of the total charge of the performing entity or entities (including mark-up) as Contractor's mark-up. No other mark-ups shall be allowed hereunder.

The Contractor shall submit to the Library daily work and material tickets, to include the identification number assigned to the change in the Work, the location and description of the change in the Work, the classification of labor employed (and names and social security numbers), hours expended, the material used, the equipment rented (not tools) and such other evidence of cost as the Library may require. The Library may require authentication of all time and material tickets and invoices by persons designated by the Library for such purpose. The failure of the Contractor to secure any required authentication shall, if the Library elects to treat it as such, constitute a waiver by the Contractor of any claim for the cost of that portion of the Change in the Work covered by a non-authenticated ticket or invoice; provided, however, that the authentication of any such ticket or invoice by the Library shall not constitute an acknowledgment by the Library that the items thereon were reasonably required for the Change in the Work.

(e) Limitations on Changes

The Contractor shall not be entitled to any amount for indirect costs, damages or expenses of any nature, including, but not limited to, so-called "impact" costs, labor inefficiency, wage, material or other escalations beyond the prices upon which the proposal is based and to which the parties have agreed pursuant to the provisions of this section, and which the Contractor, its Subcontractors and Sub-subcontractors or any other person may incur as a result of delays, interferences, suspensions, changes in sequence or the like, for whatever cause, whether reasonable or unreasonable, foreseeable or unforeseeable, or avoidable or unavoidable, arising from the performance of any and all changes in the work performed pursuant to this section. It is understood and agreed that the Contractor's sole and exclusive remedy in such event shall be recovery of its direct costs as compensable hereunder and an extension of the time of the Contract, but only in accordance with the provisions of the Contract Documents.

It is expressly agreed that Contractor shall not be entitled to claim damages for anticipated profits on any portion of the Work that may be deleted.

The amount of any adjustment for work deleted shall be estimated at the time deletion of work is ordered and the estimated adjustment will be deducted for the subsequent monthly pay estimates. The Library reserves its rights under Section 3.18 to audit Contractor's as-bid profit in connection with any deductive change, to arrive at a final adjustment. Contractor's as-bid profit shall be reduced pro rata according to the proportion of the original contract value less as-bid profit, represented by the work deleted.

The Library reserves the right to contract with any person or firm other than the Contractor for any or all Extra Work.

2.05. UNILATERAL CHANGE IN OR ADDITION TO THE WORK

Notwithstanding the above, the Library, directly or through the Library's Representative, may direct the Contractor in writing to perform changes in or additions to the scope of the Contract. The Contractor shall perform such work and the parties shall proceed pursuant to the provisions of Section 2.04.

2.06. DIFFERING SITE CONDITIONS

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

(a) Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25110.02 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; or

(b) Subsurface or latent physical conditions at the Site differing from those indicated in the Contract Documents; or

(c) Unknown 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 Architect/Engineer shall thereupon promptly investigate the conditions. If the Engineer finds that they do involve hazardous waste, or do materially differ and cause an

decrease or increase in the Contractor's cost or time of performance, the Library will issue a change order as appropriate. Any increase or decrease of cost resulting from such changes shall be adjusted in the manner provided in Section 2.04 for adjustments as to extra and/or additional work and changes. In the event that a dispute arises between the Library and the Contractor, whether the conditions materially differ, or involve hazardous waste, or cause and decrease or increase 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 by the Contract, but shall proceed with all work to be performed under the Contract, the procedures applicable to claims for extra costs shall then apply.

2.07. CLAIMS FOR EXTRA COSTS

(a) Notice of Potential Claims

- (1) It is hereby mutually agreed that the Contractor shall not be entitled to the payment of any additional compensation for any cause, including any act, or failure to act, by the Library, or the happening of any event, thing or occurrence, unless the Contractor provides the Library with written notice of the potential claims as hereinafter specified. Compliance with this section.
- (2) The written notice of potential claims shall set forth the reasons for which the Contractor believes additional compensation will or may be due, the nature of the costs involved, and, insofar as possible, the amount of the potential claim. The notice as above required shall be given to the Library prior to the time that the Contractor commences performance of the Work giving rise to the potential claim for additional compensation, if based on an act or failure to act by the Library, or in all other cases within ten (10) days after the happening of the event, thing or occurrence giving rise to the potential claim.

(b) Resolution of Claims

- (1) Submission of Claims. The Contractor may file a written claim, as defined by Public Contract Code section 9204(c)(1), with the Owner including reasonable documentation to support the claim. Upon receipt of the claim, the Owner shall conduct a reasonable review of the claim, and within a period not to exceed forty-five (45) days, the Owner shall provide the Contractor with a written statement identifying what portion of the claim is disputed and what portion is undisputed. The time in which the Owner must provide a written statement may be extended by mutual agreement of the parties as specified by Public Contract Code section 9204(d)(1)(C). The Owner shall pay any undisputed portion of the claim within sixty (60) days after issuance of its written statement.
- (2) Meet And Confer Regarding Unresolved Formal Claim. If the Contractor disputes the Owner's written statement issued pursuant to Section 2.07(b)(1) or if the Owner fails to issue a timely written response, the Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the Owner shall schedule a meet and confer conference

within thirty (30) days for settlement of the dispute. The meet and confer conference shall be attended by senior executives of the parties who have authority to settle the controversy. Within ten (10) business days following the conclusion of the meet and confer conference, the Owner shall provide the Contractor with a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. The Owner shall pay any undisputed portion of the claim within sixty (60) days after it issues its written statement.

- (3) Mediation. If the Contractor disputes, in writing, any portion of the Owner's written statement as issued under Section 2.07(b)(2), the disputed items shall be submitted to nonbinding mediation according to the provisions of Public Contract Code section 9204(d)(2), and any costs of mediation shall be allocated as set forth in that section. Upon receipt of a claim, the Owner and the Contractor may agree to waive, in writing, mediation.
- (4) Failure to Respond or Pay. If the Owner fails to timely respond to a claim from the Contractor or otherwise fails to meet the time requirements of Public Contract Code section 9204, the claim shall be deemed rejected in its entirety. Additionally, amounts not timely paid in the manner required by Public Contract Code section 9204 shall bear interest at seven (7) percent per annum.
- (5) Subcontractor Claims. If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against the Owner because privity of contract does not exist, the Contractor may present to the Owner a claim on behalf of the subcontractor or lower tier subcontractor pursuant to Public Contract Code section 9204(d)(5).
- (6) Government Claims Act. If, following compliance with the requirements with Section 2.07(b)(1-5), the claim or any portion thereof remains in dispute, the claimant may file a claim pursuant to 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 its written claim pursuant to subdivision (a) until the time the claim is denied, including any period of time utilized by the meet and confer conference

2.08. DISPUTES

Except as otherwise specifically provided in the Contract Documents, the Library will initially decide all claims of the Contractor and all disputes arising under and by virtue of the Contract. Such claim or dispute will be processed and decided by the Library as soon as practicable after its submission and the submission or availability of any additional information necessary to its decision. If the Contractor is dissatisfied with the Library's decision, the Contractor may, within fifteen (15) days from the date of the Library's decision, follow the procedures set forth in Section 2.07. If the Contractor fails to follow the procedures set forth in Section 2.07 within the fifteen (15)-day period, then the Library's decision shall be final, conclusive and binding on the Contractor.

2.09. GUARANTEE

(a) In addition to warranties, representations and guarantees stated elsewhere in the Contract Documents, the Contractor unconditionally guarantees all materials and workmanship furnished hereunder, and agrees to replace the same at its sole cost and expense, and to the satisfaction of the Engineer, any and all materials which may be defective or improperly installed.

(b) The Contractor shall repair or replace to the satisfaction of the Library any or all such work that may prove defective in workmanship or materials, ordinary wear and tear excepted, together with any other work, which may be damaged or displaced in so doing.

(c) In the event of failure to comply with the above stated conditions within a reasonable time, the Library is authorized to have the defect repaired and made good at the expense of the Contractor who will pay the costs and charges therefore immediately upon demand, including any reasonable management and administrative costs, and engineering, legal and other consultant fees incurred to enforce this section.

(d) The signing of the Contract by the Contractor shall constitute execution of the above guarantees. Except as otherwise provided in this Contract, the guarantees and warranties shall remain in effect for a period of one (1) year after final acceptance of the Work by the Library.

SECTION 3 CONTROL OF WORK

3.01. AUTHORITY OF LIBRARY'S REPRESENTATIVE

(a) The Library's Representative is the representative of the Library and has full authority to interpret the Contract Documents, to conduct the construction review and inspection of the Contractor's performance, and to decide questions, which arise during the course of the Work and the Library's Representative's decisions on these matters, shall be final and conclusive. The Library's Representative has the authority to reject all work and materials, which do not conform to the Contract Documents, and has the authority to stop the Work whenever such stoppage may be necessary to insure the proper execution of the Contract. The Library's Representative's failure to stop the Work shall not obligate the Library to accept defective or otherwise unacceptable work or otherwise affect the Library's Representative's or Library's authority to reject work for any reason set forth in the Contract Documents.

(b) If at any time the Contractor's work force, tools, plant or equipment appear to the Library's Representative to be insufficient or inappropriate to secure the required quality of work or the proper rate of progress, the Library's Representative may order the Contractor to increase their efficiency, improve their character, to augment their number or to substitute other personnel, new or additional tools, plant or equipment, as the case may be, and the Contractor shall comply with such order. Neither the failure of the Library's Representative to demand such increase of efficiency, number, or improvement, nor the compliance by the Contractor with the demand, shall relieve the Contractor of its obligation to provide quality work at the rate of progress necessary to complete the Work within the specified time.

(c) The Library's Representative may authorize minor variations in the work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time. These may be accomplished by a Field Order. Contractor shall comply promptly with all Field Orders. If the Library's Representative and Contractor are unable to agree on entitlement or on the amount or extent, if any, of any adjustment in the Contract Price or Contract time, or cost, as a result of a Field Order, a claim may be made therefor pursuant to Section 2.07.

(d) Any order given by the Library's Representative, not otherwise required by the Contract Documents to be in writing shall, on request of the Contractor, be given or confirmed by the Engineer in writing.

(e) Whenever work, methods of procedure, or any other matters are made subject to direction or approval, such direction or approval will be given by the Library's Representative.

(f) If the Contractor, in the course of the Work, finds any discrepancy between the Drawings and the physical condition of the locality, or any errors or omissions in the Drawings, or in the layout as given by points and instructions, it shall be the Contractor's duty to inform the Architect in writing, and the Architect will promptly verify the same.

Any work done after such discovery, until authorized, will be done at the Contractor's risk. All Drawings, Specifications, and copies thereof furnished by the Architect are the property of the Architect and shall not be reused on other work and, with the exception of the signed Contract sets, are to be returned to the Architect, on request, at the completion of the Work. All models are the property of the Library.

(g) The Drawings shall be supplemented by such Shop Drawings prepared by the fabricator and/or supplier and Working Drawings prepared by the Contractor as are necessary to adequately control the Work. No changes shall be made by the Contractor in any Shop or Working Drawings after they have been reviewed by the Architect, if the Architect deems that no further submittals are necessary. The Contractor shall not commence the layout, purchase, fabrication, or construction of any work for which Shop or Working Drawings are required until Engineer has reviewed the specifications and drawings and has indicated in writing no further submittals are required for compliance with the Contract Documents.

(h) Shop and Working Drawings for any structure shall include, but not be limited to, detail design calculations, fabrication and installation drawings, lists, graphs, operating instructions, etc., which shall be reviewed and accepted by the Architect before any such work is performed.

(i) Shop and Working Drawings will be required for cribs, cofferdams, falsework, centering and form work and for other temporary work and methods of construction the Contractor proposes to use. Such Drawings shall be subject to the review and acceptance of the Architect insofar as the details affect the character of the finished work, but details of design will be left to the Contractor who shall be responsible for the successful construction of the Work.

(j) Contractor agrees that Shop and/or Working Drawings processed by the Architect are not Change Orders; that the purpose of these Drawings submitted by the Contractor is to demonstrate to the Architect that the Contractor understands the design concept, that the Contractor demonstrates its understanding by indicating which equipment and material the Contractor intends to furnish and by detailing the fabrication methods it intends to use. It is expressly understood, however, that favorable review of the Contractor's Shop and Working Drawings shall not relieve the Contractor of any responsibility for accuracy of dimensions and details, or for mutual agreements of dimensions and details. It is mutually agreed that the Contractor shall be responsible for agreement and conformity of its Drawings with the Specifications. Contractor further agrees that if deviations, discrepancies or conflicts between Shop and/or Working Drawings and Specifications are discovered either prior to or after the Drawings are processed by the Architect, the Specifications shall control and shall be followed.

(k) Unless otherwise stated, the Architect shall have thirty (30) days from the date of receipt of Shop and/or Working Drawings for review.

(l) Full compensation for furnishing all Shop and/or Working Drawings shall be considered as included in the prices paid for the Contract items of work to which such drawings relate and no additional compensation will be allowed therefore. Any cost related to the Architect's review of any particular set of Shop and/or Working Drawings more than twice, due to incompleteness or unacceptability, shall be borne by the Contractor, and the Library reserves the right to withhold such costs from payments due the Contractor.

(m) All reasonable effort has been made to locate and delineate all known structures and facilities on the plans. Except as otherwise provided herein, the Library shall assume no responsibility for the completeness or accuracy of its delineation of underground utilities nor the existence of other buried objects which may be encountered, or which are not shown on the plans.

(n) The Contractor shall keep and maintain a clean set of plans for the project and shall record in red ink all changes, revisions, etc. made during the course of construction. These plans shall include all changes, revisions, etc. from the original plan complete with the exact sizes, locations, dimensions, elevations, etc. These plans shall be kept and maintained in a neat, clean and legible condition and shall be available for inspection at all times by the Architect. The Contractor shall deliver these completed plans to the Architect and the Architect shall approve these plans prior to final acceptance of the project by the Library.

3.02. PERMITS AND REGULATIONS

Permits and licenses, of a temporary nature, necessary for the prosecution of the Work shall be secured and paid for by the Contractor. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Library unless otherwise specified.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as shown on the plans and described in the Specifications. Contractor shall promptly notify the Architect in writing of any specification at variance therewith. In such instances, any necessary changes shall be adjusted as provided in the Contract for changes in the Work. If the Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules, and regulations and without such notice to the Architect, Contractor shall bear all costs arising therefrom.

3.03. CONFORMITY WITH CONTRACT DOCUMENTS AND ALLOWABLE DEVIATIONS

Work and materials shall conform to the lines, grades, cross sections, dimensions and material requirements, including tolerances, shown on Contract Documents. Although measurement, sampling, and testing may be considered evidence as to such conformity, the Architect shall be the sole judge as to whether the Work or materials deviate from the Contract Documents. The Architect's decision as to any allowable deviations therefrom shall be final and conclusive.

3.04. COORDINATION AND INTERPRETATION OF CONTRACT DOCUMENTS

(a) Should it appear that the Work to be done or any of the matters relative thereto are not sufficiently detailed or explained in the Specifications and Plans, the Contractor shall apply to the Architect for such further explanations as may be necessary and shall conform to them as part of the Contract. In the event of any doubt or question arising respecting the true meaning of the Specifications and Plans, reference shall be made to the Architect, whose decision thereon shall be final and conclusive.

(b) Any reference made in the Specifications and Plans to any specification, standard, method, or publication of any scientific or technical society or other organization shall, in the absence of a specific designation to the contrary, be understood to refer to the specification, standard, method, or publication in effect as of the date that the Work is advertised for Bids.

3.05. SUBCONTRACTORS

(a) The attention of the Contractor is directed to the provisions of California Public Contract Code sections 4100-4113 regarding subcontracting and said provisions are by this reference incorporated herein and made a part hereof.

(b) Each subcontract shall contain a suitable provision for the suspension or termination thereof should the Work be suspended or terminated or should the Subcontractor neglect or fail to conform to every provision of the Contract Documents insofar as such provisions are relevant. The Contractor shall be fully responsible to the Library for the acts or omissions of the Contractor's Subcontractors and of the persons either directly or indirectly employed by the Contractor. Nothing contained in the Contract Documents shall create any contractual relationship between any Subcontractor and the Library. If a legal action, including arbitration and litigation, against the Library is initiated by a Subcontractor or Supplier, the Contractor shall reimburse the Library for the amount of legal, engineering and all other expenses incurred by the Library in defending itself in said action.

(c) The Library, the Library's Representative and the Architect reserve the right to approve all Subcontractors.

Such approval shall be a consideration to the awarding of the Contract and unless notification to the contrary is given to the Contractor prior to the signing of the Contract, the list of Subcontractors which is submitted with the Contractor's proposal will be deemed to be acceptable. Contractor shall not, without the written consent of the Library, subcontract the whole of the Work.

3.06. COOPERATION OF CONTRACTORS

(a) Should construction be under way by other forces or by other contractors within or adjacent to the limits of the Work specified or should work of any other nature be under way by other forces within or adjacent to said limits, the Contractor shall cooperate with all such other contractors or other forces to the end that any delay or hindrance to their work will be avoided. The right is reserved to perform other or additional work at or near the site (including material sources) at any time, by the use of other forces.

(b) When two or more contractors are employed on related or adjacent work, each shall conduct its operation in such a manner as not to cause any unnecessary delay or hindrance to the other. Each contractor shall be responsible to the other for all damage to work, to persons or property caused to the other by its operations, and for loss caused the other due to unnecessary delays or failure to finish the work within the time specified for completion.

3.07. SUPERINTENDENCE

(a) The Contractor shall designate in writing, before starting work, an individual as authorized representative who shall have the authority to represent and act for the Contractor. This authorized representative shall be present at the Site of the Work at all times while work is actually in progress on the Contract. When the Work is not in progress and during periods when the Work is suspended, arrangements acceptable to the Library shall be made for any emergency work, which may be required.

(b) The Contractor is solely responsible, at all times, for the superintendence of the Work and for its safety and progress.

(c) Whenever the Contractor or its authorized representative is not present on any particular part of the Work where it may be desired to give direction, orders will be given by the Library, which shall be received and obeyed by the superintendent or foreman who may have charge of the particular work in reference to which the orders are given.

(d) Any order given by the Library, not otherwise required by the Specifications to be in writing, will on request of the Contractor, be given or confirmed by the Library in writing.

3.08. INSPECTION OF WORK

(a) Unless otherwise provided, all equipment, materials, and work shall be subject to inspection and testing by the Architect /Engineer & Library's 3rd Party Testing Agency. The Architect /Engineer & Library's 3rd Party Testing Agency will observe the progress and quality of the Work and determine, in general, if the Work is proceeding in accordance with the intent of the Contract Documents. The Architect /Engineer & Library's 3rd Party Testing Agency shall not be required to make comprehensive or continuous inspections to check the quality of the Work. The Architect /Engineer & Library's 3rd Party Testing Agency shall not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work. Visits and observations made by the Architect /Engineer & Library's 3rd Party Testing Agency shall not relieve the Contractor of Contractor's obligation to conduct comprehensive inspections of the Work and to furnish proper materials, labor, equipment and tools, and perform acceptable work, and to provide adequate safety precautions, in conformance with the intent of the Contract.

(b) Whenever the Contractor varies the period during which work is carried on each day, the Contractor shall give due notice to the Architect /Engineer & Library's 3rd Party Testing Agency so that proper inspection may be provided. Any work done in the absence of the Architect /Engineer & Library's 3rd Party Testing Agency shall be subject to rejection. Proper facilities for safe access for inspection to all parts of the Work shall at all times be maintained for the necessary use of the Architect /Engineer & Library's 3rd Party Testing Agency and other agents of the Library, and agents of the federal, state, or local governments at all reasonable hours for inspection by such agencies to ascertain compliance with laws and regulations.

(c) One or more inspectors may be assigned to observe the Work by the Architect /Engineer & Library's 3rd Party Testing Agency and to act in matters of construction under this Contract. It is understood that inspectors shall have the power to issue instructions and make decisions within the limitations of the authority of the Architect /Engineer & Library's 3rd Party Testing Agency. Such inspection shall not relieve the Contractor of the Contractor's obligation to conduct comprehensive inspections of the Work, to furnish proper materials, labor, equipment and tools, and perform acceptable work, and to provide adequate safety precautions in conformance with the intent of the Contract.

(d) The Architect /Engineer & Library's 3rd Party Testing Agency and the Architect /Engineer & Library's 3rd Party Testing Agency's representatives shall at all times have access to the Work wherever it is in preparation or progress, and the Contractor shall provide safe and convenient facilities for such access and for inspection. If the Specifications, the Architect /Engineer & Library's 3rd Party Testing Agency's instructions, laws, ordinances, or any public authority require any material, equipment or work to be specifically tested or approved, the Contractor shall give the Architect /Engineer & Library's 3rd Party Testing Agency timely notice of its readiness for inspection, and if the inspection is by an authority other than the Library, of the time fixed for inspection. Inspections by the Architect /Engineer & Library's 3rd Party Testing Agency will be made promptly and, where practicable, at the source of supply.

(e) Work performed without inspection may be required to be removed and replaced under proper inspection. In such instances, the entire cost of removal and replacing, including the cost of Library-furnished materials used in the Work, shall be borne by the Contractor, regardless of whether or not the Work exposed is found to be defective. Examination of

questioned work, other than that installed without inspection, may be ordered by the Architect /Engineer & Library's 3rd Party Testing Agency and, if so ordered, the Work must be uncovered by the Contractor. If such work is found to be in accordance with the Contract Documents, the Library will pay the cost of re-examination and replacement. If such work is found to be not in accordance with the Contract Documents, the Contractor shall pay such cost, unless the Contractor can show that the defect in the Work was caused by another contractor, and in that event the Library will pay such costs.

(f) The inspection of the Work shall not relieve the Contractor of the Contractor's obligation to fulfill the Contract as herein prescribed, or in any way alter the standard of performance provided by the Contractor, and defective work shall be made good and unusable materials may be rejected, notwithstanding that such work and materials have been previously overlooked by the Architect /Engineer & Library's 3rd Party Testing Agency and accepted or estimated for payment. If the Work or any part thereof shall be found defective, the Contractor shall, within ten (10) calendar days, make good such defect in a manner satisfactory to the Architect /Engineer & Library's 3rd Party Testing Agency. If the Contractor fails to make ordered repairs of defective work or to remove the condemned materials from the Work within ten (10) calendar days after written direction by the Architect /Engineer & Library's 3rd Party Testing Agency, the Library may make the ordered repairs, or remove the condemned materials, and deduct the cost thereof from any monies due the Contractor.

(g) The Contractor shall furnish promptly, without additional charge, all facilities, labor and materials reasonably needed by the Architect /Engineer & Library's 3rd Party Testing Agency for performing all inspection and tests. Contractor shall be charged with any additional cost of inspection when material and workmanship are not ready at the time specified by the Contractor for its inspection.

(h) Where any part of the Work is being done under an encroachment permit or building permit, or is subject to federal, state, county or Library codes, laws, ordinances, rules or regulations, representatives of the government agency shall have full access to the Work and shall be allowed to make any inspection or tests in accordance with such permits, codes, laws, ordinances, rules, or regulations. If advance notice of the readiness of the Work for inspection by the governing agency is required, the Contractor shall furnish such notice to the appropriate agency.

(i) The Architect /Engineer & Library's 3rd Party Testing Agency may inspect the production of material, or the manufacture of products at the source of supply. Plant inspection, however, will not be undertaken until the Architect /Engineer & Library's 3rd Party Testing Agency is assured of the cooperation and assistance of both the Contractor and the material producer. The Architect /Engineer & Library's 3rd Party Testing Agency or the Architect /Engineer & Library's 3rd Party Testing Agency's authorized representative shall have free entry at all times to such parts of the plant as concerns the manufacture or production of the materials. Adequate facilities shall be furnished free of charge to make the necessary inspection. The Library assumes no obligation to inspect materials at the source of supply.

3.09. TESTS

The Library shall perform, at the Library's own expense, all tests specified or required by the Specifications. The Engineer may perform such tests as the Engineer deems necessary to determine the quality of work or compliance with Contract Documents. The Contractor shall furnish promptly without additional charge all facilities, labor, and material reasonably required for performing safe and convenient tests as may be required by the Engineer. All tests by the

Engineer will be performed in such a manner as will not unnecessarily delay the Work. The Contractor shall not be required to reimburse the Library for tests performed by the Library or Engineer. If samples of materials are submitted which fail to pass the specified tests, the Contractor shall pay for all subsequent tests. The Library is responsible for the 3rd party testing. It is the only way to keep it impartial.

3.10. REMOVAL OF REJECTED AND UNAUTHORIZED WORK AND MATERIALS

(a) All work or materials, which have been rejected, shall be remedied, or removed and replaced by the Contractor in an acceptable manner and no compensation shall be allowed the Contractor for such removal, replacement, or remedial work.

(b) Any work done beyond the lines and grades shown on the plans or established by the Architect or any Extra Work done without written authority will be considered as unauthorized work and will not be paid for. Upon order of the Architect or Library Representative, unauthorized work shall be remedied, removed, or replaced at the Contractor's expense.

(c) Upon failure of the Contractor to comply with any order of the Architect or Library Representative made under this section, the Library may cause rejected or unauthorized work to be remedied, removed, or replaced, and may deduct the costs therefore from any monies due or to become due the Contractor.

3.11. DEDUCTIONS FOR UNCORRECTED WORK

If the Architect or Library Representative deems it inexpedient to correct work damaged or not done in accordance with the Contract, an equitable deduction from the Contract price shall be made therefore, and such sum may be withheld by the Library from Contractor's payment.

3.12. EQUIPMENT AND PLANTS

(a) Only equipment and plants suitable to produce the quality of work and materials required will be permitted to operate on the Project.

(b) Plants will be designed and constructed in accordance with general practice for such equipment and shall be of sufficient to insure the production of sufficient material to carry the Work to completion within the time limit.

(c) The Contractor shall provide adequate and suitable equipment and plants to meet the above requirements, and when ordered by the Architect or Library Representative, shall remove unsuitable equipment from the Work and discontinue the operation of unsatisfactory plants. Contractor shall, upon request of the Architect or Library Representative, submit one or more lists identifying, by make, model number, contractor's identification number and empty gross weight, each piece of operable equipment used for the Work. Contractor shall, upon request of the Architect or Library Representative, submit documentation establishing that any measuring device used for the Work has been tested and properly approved under California Test 109.

(d) In the case of termination of this Contract before its completion for any cause whatsoever, the Contractor, if notified to do so by the Library, shall promptly remove any part or all of its equipment and supplies from the property of the Library. If the Contractor fails to do so, the Library shall have the right to remove such equipment and supplies at the expense of the Contractor.

3.13. CHARACTER OF WORKER

If any Subcontractor, or person employed by the Contractor or any Subcontractor fails or refuses to carry out the directions of the Architect or Library Representative or appears to the Architect or Library Representative to be incompetent or to act in a disorderly or improper manner, said person shall be removed from the Project immediately on the requisition of the Architect or Library Representative. That person shall not again be employed on the Work. Such discharge shall not be the basis for any claim for compensation or damages against the Library, or any of its officers or agents.

3.14. SEPARATE CONTRACTS

(a) The Library reserves the right to let other contracts in connection with this Work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate Contractor's work with the other contractor's work.

(b) If any part of the Contractor's work depends on proper execution or results upon the Work of any other contractor, the Contractor shall inspect and promptly report to the Library Representative any defects in such work that render it unsuitable for such proper execution and results. The Contractor's failure to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of the Contractor's work, except as to defects which may develop in the other contractor's work after the execution of the Contractor's work.

(c) To insure the proper execution of Contractor's subsequent work, the Contractor shall measure work already in place and shall at once report to the Library Representative any discrepancy between the executed work and the Drawings.

3.15. ASSIGNMENT

The Contractor shall not assign the Contract or sublet it as a whole or in part without the written consent of the Library, nor shall the Contractor assign any monies due, or to become due to the Contractor hereafter without the prior written consent of the Library.

3.16. USE OF COMPLETED PORTIONS, RIGHT TO OPERATE UNSATISFACTORY EQUIPMENT OR FACILITIES

(a) The Library may, at any time, and from time to time, during the performance of the Work, enter the Work Site for the purpose of installing any necessary work by Library labor or other contracts, and for other purpose in connection with the installation of facilities. In doing so, the Library shall endeavor not to interfere with the Contractor and the Contractor shall not interfere with other work being done by or on behalf of the Library.

(b) If, prior to completion and final acceptance of all the Work, the Library takes possession of any structure or facility (whether completed or otherwise) comprising a portion of the Work with the intent to retain possession thereof (as distinguished from temporary possession contemplating the return to the Contractor), then, while the Library is in possession of the same, the Contractor shall be relieved of liability for loss or damage to such structure other than that resulting from the Contractor's fault or negligence. Such taking of possession by the Library shall not relieve the Contractor from any provisions of this Contract regarding such structure, other than to the extent specified in the preceding sentence, nor shall such taking constitute a final acceptance of such structure or facility.

(c) If, following installation of any equipment or facilities furnished by the Contractor, defects requiring correction by the Contractor are found, the Library shall have the right to operate such unsatisfactory equipment or facilities and make reasonable use thereof until the equipment or facilities can be shut down for correction of defects without injury to the Library.

3.17. LANDS FOR WORK, RIGHT-OF-WAY CONSTRUCTION ROADS

(a) The Library will provide the lands, easements, right-of-way, and/or encroachment permits necessary or other rights to enter and work on lands necessary for the performance of the Work. Other permits and licenses are addressed by Section 3.02. Should the Contractor find it advantageous to use any additional land for any purpose whatever, the Contractor shall provide for the use of such land at its expense. The Library or Library Representative shall be furnished with a copy of written agreements or otherwise be notified in writing of additional working space which is acquired. Nothing herein contained and nothing marked on the Plans shall be interpreted as giving the Contractor exclusive occupancy of the territory provided by the Library. When two or more contracts are being executed at one time on the same or adjacent land in such a manner that work on one contract may interfere with that on another, the Library or Library Representative shall decide which contractor shall cease work, and which shall continue, or whether the work on both contracts shall progress at the same time and in what manner, and the decision of the Library or Library Representative shall be final and binding. When the territory of one contract is the necessary or convenient means of access for the performance of another contract, such privilege of access or any other reasonable privilege may be granted by the Library or Library Representative to the contractor so desiring, to the extent, amount, in the manner, and at the time permitted. No such decision as to the method or time of conducting the Work or the use of territory shall be the basis of any claim for delay or damage.

(b) Lands, easements or rights-of-way to be furnished by the Library for construction operations will be specifically shown on the Plans.

(c) The Contractor shall construct and maintain all roads necessary to reach the various parts of the Work and for the transportation thereto of construction material and personnel. The cost of constructing and maintaining such roads shall be borne by the Contractor.

3.18. LIBRARY'S RIGHT TO AUDIT AND PRESERVATION OF RECORDS

(a) The Contractor shall maintain books, records and accounts of all costs in accordance with generally accepted accounting principles and practices. The Library and its authorized representatives shall have the right to audit the books, records and accounts of the Contractor under any of the following conditions:

- (1) The Contract is terminated for any reason in accordance with the provisions of the Contract Documents in order to arrive at equitable termination costs;
- (2) In the event of a disagreement between the Contractor and the Library over the amount due the Contractor under the terms of the Contract;
- (3) To check or substantiate any amounts invoiced or paid which are required to reflect the costs of the Contractor, or the Contractor's efficiency or effectiveness under this Contract or in connection with

extras, changes, claims, additions, back charges, or others, as may be provided for in this Contract;

- (4) If it becomes necessary to determine the Library's rights and the Contractor's obligations under the Contract or to ascertain facts relative to any claim against the Contractor which may result in a charge against the Library;
- (5) To determine any difference in cost occasioned by a permissible substitution;
- (6) And/or for any other reason in the Library's sole judgment.

(b) Contractor shall provide the Library (or its representatives), unlimited, reasonable access during working hours to the Contractor's books and records. The Library's audit rights shall be liberally construed in the Library's favor.

(c) The Contractor, from the effective date of final payment or termination hereunder, shall preserve and make available to the Library for a period of three (3) years thereafter, at all reasonable times at the office of the Contractor (but without any charge to the Library), all its books, records, documents, photographs, micro-photographs, and other evidence bearing on the costs and expenses of the Contractor under this Contract and relating to the Work hereunder.

(d) The Library will make all payments required of it under this Contract subject to audit, under circumstances stated above, which audit may be performed at the Library's option, either during the Contract time period or during the record retention time period. Regardless of authorization, approval or acceptance, signatures or letters which are given by the Library and are part of the Library's control systems or are requested by the Contractor, the payments made under this Contract shall not constitute a waiver or agreement by the Library that it accepts as correct the billings, invoices or other charges on which the payments are based. If the Library's audit produces a claim against the Contractor, the Library may pursue all its legal remedies even though it has made all or part of the payments required by this Contract.

(e) If any audit by the Library or its representative discloses an underpayment by the Library pursuant to the terms of the Contract Documents, the Library shall have the duty to pay any amount found by the audit to be owed to the Contractor. If such audit discloses an overpayment, the Contractor shall have the obligation to reimburse the Library for the amount of the overpayment. The Library's right to claim reimbursement from the Contractor of any overpayment shall not be terminated or waived until three years after the completion of the Library's audit or upon the termination of audit rights under subparagraph 3.18(f), whichever date is later. The obligation of the Contractor to make reimbursements hereunder shall not terminate except as provided by law.

(f) The Library's right to audit and the preservation of records shall terminate at the end of three (3) years after the date final payment is made or termination of the Contract. The Contractor shall include this "Right to Audit and Preservation of Records" clause in all subcontracts issued by it and it shall require the same to be inserted by all lower tier Subcontractors in their subcontracts, for any portion of the work. Should Contractor fail to include this clause in any such contract or lower tier contract, or otherwise fail to insure the Library's rights hereunder, Contractor shall be liable to the Library for all costs, expenses and attorney's fees which the Library may have to incur obtaining or attempting to obtain an audit or inspection of or the restoration of records which otherwise would have been available to the

Library from said persons under this clause. Such audit may be conducted by the Library or its authorized representative.

SECTION 4 CONTROL OF MATERIALS

4.01. MATERIALS

(a) Unless otherwise specifically stated in the Specifications, the Contractor shall furnish all materials necessary for the execution and completion of the Work. Unless otherwise specified, all materials shall be new and shall be manufactured, handled, and installed in a workmanlike manner to insure completion of the Work in accordance with the Contract Documents. The Contractor shall, upon request of the Architect or Library Representative, furnish satisfactory evidence as to the kind and quality of materials.

(b) Where materials are to be furnished by the Library, the type, size, quantity and location at which they are available will be stated in the Contract Documents.

(c) Manufacturers' warranties, guarantees, instruction sheets and parts listed, which are furnished with certain articles or materials incorporated in the Work, shall be delivered to the Engineer before acceptance of the Contract.

4.02. STORAGE OF MATERIALS

Articles or materials to be incorporated in the Work shall be stored in such a manner as to insure the preservation of their quality and fitness for the Work, and to facilitate inspection.

4.03. TRADE NAMES AND ALTERNATIVES

Whenever a material, article, system or sub-system is specified or described by using the name and/or model of a proprietary product or trademark or the name of the manufacturer or vendor, the specified item shall establish the type, function, and quality required. It shall be understood that the words "or approved equivalent" are implied whether or not they follow the proprietary enumeration.

The Library reserves the right to determine when proprietary items have no equivalency, and when uniformity of operations, interchangeability of parts, standard parts inventory, etc., are in the Library's best interest.

Requests for review of equivalency will be considered upon submission of sufficient information as described herein, to allow complete review. Such requests shall not be accepted from anyone other than the Contractor. Such submission must be made prior to purchase, fabrication, manufacture or use of the equivalent items under consideration.

(a) **Contractor's Risk.** If the Contractor includes in its bid or later proposes any material, product or equipment that the Contractor considers equivalent to that specified, the Contractor assumes all risk of any sort associated with acceptance or rejection of proposed equivalent items. The Contractor shall have no right to make claim based upon Contractor's bid that includes a proposed equivalent item(s) of work which resulted in a lower bid amount for said item(s) or lower total bid.

(b) **Submission Requirements.** Each submission for equivalency review shall include:

- (1) Justification for use of the proposed equivalent item(s), including evidence, as applicable, that Contract specified material, product or equipment is unobtainable or unobtainable within an acceptable time for contract completion;
- (2) A description of the difference between specified item(s) and proposed equivalent item(s) and the comparative advantages and disadvantages of each;
- (3) All relevant data addressing each specified parameter to show equivalency;
- (4) A prediction of any effects the proposed change will have on operation and maintenance costs where applicable.
- (5) Equivalency. An item will be considered equivalent to the item specified if it is equal to or better in:
- (6) Design and strength in all sub-parts, quality, reliability and durability, operation, maintenance and serviceability, as applicable; and
- (7) Specified parameters in performance in all respects for the specific function(s) indicated in the contract.

(c) Supplemental Requirements. Any tests required by the Library to establish quality and performance standards shall be promptly conducted by or through the Contractor at no additional cost to the Library. In addition, the Contractor shall:

- (1) Submit any additional data requested by the Library or Library Representative for the equivalency review; and
- (2) Satisfactorily accomplish all changes, including any Engineering associated with use of equivalent items, at no additional cost to the Library.

(d) Equivalency Determinations. The Library or Library Representative shall be the sole judge as to equivalency determinations. The Library or Library Representative's decision shall be final. The Contractor shall have no right of appeal to any decision rejecting the equivalency of any item.

(e) Procedure.

- (1) Data substantiating a request for a substitution of "an equal" item shall be submitted prior to the Award of the Contract pursuant to Section 3400 of the Public Contract Code.
- (2) After the bid opening, the apparent three low bidders shall have seven (7) calendar days to provide complete substantiating data for all product, material or system substitution requests. After this seven (7)-day period, the Library may award the Contract to the apparent low bidder. In no event will product, material or system substitution requests submitted after the Award of Contract be considered. Failure to submit such substantiating data will result in the automatic rejection of the proposed

substitution request. The Library will have thirty (30) days to review the first ten (10) proposed substitution requests. For each additional five (5) product, material or system substitution requests over and above the initial ten (10), the Library will have ten (10) additional days to review the proposed substitution requests.

- (3) Each substitution request may include one alternate substitution. All alternate substitutions shall be submitted concurrently with substitution requests. Upon review by the Library, proposed substitutions shall be returned to the bidder marked either “accepted” or “rejected”. The Library shall only review alternative substitution requests if the primary substitution request is rejected. If a substitution request, and its alternative, is returned “rejected”, no further substitution requests for that product, material or system will be allowed and the bidder will provide the specified product, material or system.
- (4) If, after all substitution requests have been processed, substitution requests by the apparent low bidder are rejected by the Library, the apparent low bidder may elect not to execute the Contract. Under no circumstances, will bidders be allowed to alter their Bid Price as originally submitted. This election shall be made in writing no later than five (5) days following the receipt of the reviewed substitution requests. An election by the bidder not to execute the Contract will result in the forfeiture of the bidder’s bid bond. If the apparent low bidder elects not to continue, and the second low bidder is awarded the Contract, the second low bidder may then elect not to execute the Contract for the contract price shown on its Bid Form. Subsequent bidders shall have five (5) days following the receipt of the reviewed substitution requests and the Notice of Award in which to make their election. This process shall continue until one bidder decides to continue with the Award of Contract process.
- (5) The Library may award the Contract at any time after the time for submitting substitution requests expires pursuant to subpart (2), above. In the event the Contract is awarded prior to acceptance/rejection of substitution requests, all outstanding substitution requests shall be reviewed by the Library as provided above. If the apparent low bidder elects not to execute the Contract, the Award of Contract to the apparent low bidder shall be rescinded and the Contract awarded to the next apparent low bidder. All bidders electing not to execute the Contract expressly agree that the Library shall incur no liability for such rescissions. As provided herein, “apparent low bidder” means the lowest responsive and responsible bidder.

4.04. CERTIFICATES OF COMPLIANCE

(a) A Certificate of Compliance shall be furnished prior to the use of any materials for which the Technical Specifications require that such a certificate be furnished. In addition, when so authorized in the Specifications, the Architect or Library Representative may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The Certificate of Compliance shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials

involved comply in all respects with the requirements of the Contract. A Certificate of Compliance shall be furnished with each lot of material delivered to the Work and the lot so certified shall be clearly identified in the Certificate.

(b) All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the Work which conforms to the requirements of the Contract Documents and any such material not conforming to such requirements will be subject to rejection whether in place or not.

(c) The Library reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

(d) The form of the Certificate of Compliance and its disposition shall be as directed by the Architect or Library Representative.

SECTION 5
LEGAL RELATIONS AND RESPONSIBILITY

5.01. COMPLIANCE WITH LAWS – PERMITS, REGULATIONS, TAXES

The Contractor is an independent contractor and shall, at the Contractor's sole cost and expense, comply with all laws, rules, ordinances and regulations of all governing bodies having jurisdiction over the Work, obtain all necessary permits and licenses therefore, pay all manufacturers' taxes, sales taxes, use taxes, processing taxes, and all federal and state taxes, insurance and contributions for social security and unemployment which are measured by wages, salaries or any remuneration paid to Contractor's employees, whether levied under existing or subsequently enacted laws, rules or regulations. The Contractor shall also pay all property tax assessments on materials or equipment used until acceptance by the Library. If any discrepancy or inconsistency is discovered in the Plans or Specifications, or in this Contract in relation to any such law, rule, ordinance, regulation, order or decree, the Contractor shall forthwith report the same to the Library Representative in writing. The Contractor shall also protect, defend and indemnify the Library, Library Representative the Architect, and all of the Library's officers, agents, and servants against any claim or liability arising from or based upon the violation of any such law, rule, ordinance, regulation, order or decree, whether by the Contractor or its employees. Particular attention is called to the following:

(a) Without limitation, materials furnished and performance by Contractor hereunder shall comply with Safety Orders of the Division of Industrial Safety, State of California, Federal Safety regulations of the Bureau of Labor, Department of Labor; and any other applicable Federal regulations.

(b) The Contractor, upon request shall furnish evidence satisfactory to the Library and Architect that any or all of the foregoing obligations have been or are being fulfilled. The Contractor warrants to the Library that it is licensed by all applicable governmental bodies to perform this Contract and will remain so licensed throughout the progress of the Work, and that Contractor has, and will have, throughout the progress of the Work, the necessary experience, skill and financial resources to enable the Contractor to perform this Contract.

(c) Contractor is required to insure that material safety data sheets (MSDS's) for any material requiring a material safety data sheet pursuant to any federal or state law are available in a readily accessible place on the Project premises. Contractor is also required to insure:

- (1) The proper labeling of any substance brought onto the Project premise by Contractor or any subcontractors and
- (2) That the person(s) working with the material, or within the general area of the material, are appropriately informed about the hazards of the substance and follow proper handling and protection procedures.

(d) Contractor is required to comply with the provisions of California Health and Safety Code section 25249.5, et seq. (Prop. 65), which requires the posting and giving of notice to persons who may be exposed to any chemical known to the State of California to cause cancer.

5.02. PREVAILING WAGE

(a) The Contractor shall forfeit as penalty to the Library the amount specified by law for each calendar day or portion thereof for each worker (whether employed by the Contractor or any Subcontractor) paid less than the stipulated prevailing rates for any work done under the Contract in violation of the provisions of the Labor Code and in particular, Section 1775 which is incorporated herein by reference.

(b) The Library will not recognize any claims for additional compensation because of the payment of the wages set forth in these General Conditions. The possibility of wage increases is one of the elements to be considered by the Contractor in determining its proposal, and will not under any circumstances, other than delays caused by the Library, the Architect, or the Library's agents, be considered as the basis of a claim against the Library.

(c) The Contractor agrees to follow the instructions of the Library's labor compliance officer until notified otherwise in writing by the Library.

(d) The Director of the Department of Industrial Relations of the State of California has determined the general prevailing rate of wages of per diem wages in the locality in which the work is to be performed for each craft or type of worker needed to execute the Contract. The Contractor shall post a copy of this document at the prevailing wages at each job site, along with a work place poster (available from the Department of Industrial Relations), printed on 8 1/2" X 11" paper or larger, in accordance with California Code of Regulations, Title 8, section 16451(d).

5.03. PREVAILING WAGE RECORDS

(a) The Work is subject to monitoring and enforcement of prevailing wage requirements by the Department of Industrial Relations ("DIR") and the following provisions will apply:

- (1) Contractor and subcontractors shall maintain and furnish to the DIR, a certified copy of each weekly payroll (but no less often than monthly), with a statement of compliance signed under penalty of perjury. Such certified payroll reports in PDF form shall be transmitted electronically to the DIR. The provisions of Labor Code section 1776 are incorporated herein by reference.
- (2) The Library and the DIR shall review, including by way of job site inspections, and, if appropriate, audit payroll records to verify compliance with the public works requirements of the Labor Code. The DIR will notify the Contractor or Subcontractor(s), as appropriate) of any noncompliance, in order for all such Contractor or Subcontractor(s) to correct the noncompliance.
- (3) The Library shall withhold payments when payroll records are delinquent or inadequate.
- (4) The Library shall withhold payments equal to the amount of underpayment and applicable penalties when, after investigation, it is established that underpayment has occurred.

- (5) The Library shall cooperate with the DIR and DLSE in any investigation of suspected violations of prevailing wage requirements.
- (6) As directed by the Labor Commissioner, the Library shall withhold Contract payments equal to the payments due or estimated to be due to the Contractor or Subcontractors whose payroll records are delinquent or inadequate, plus any additional amount that the Labor Commissioner has reasonable cause to believe may be needed to cover a back wage and penalty assessment against such Contractor or Subcontractors. The Contractor shall be required to withhold payments to a Subcontractor whose payroll records are delinquent or inadequate until the Labor Commissioner provides notice that the Subcontractor has cured such delinquency or deficiency.
- (7) These payroll records shall be made available to the Library's representatives. These records shall be maintained during the course of the Work. The Contractor and all subcontractors shall make the certified payroll records available for inspection by Library representatives upon request and shall permit such representatives to interview employees during the work hours on the job site.
- (8) The Contractor shall be held entirely responsible for the prompt resolution of all non-compliances with the prevailing wage laws, including those pertaining to all subcontractors and any lower tier subcontractors.
- (9) The Project will not be accepted as complete by the Library nor final payment made until all items of non-compliance are corrected or until appropriate provision is made by depository agreement to assure the ultimate resolution and payment of any back wages that may be found due.

(b) A pre-construction conference shall be conducted before commencement of the Work with the Contractor and subcontractors at which time the prevailing wage requirements will be reviewed and agreed to by all parties.

5.04. LABOR DISCRIMINATION

Attention is directed to Section 1735 of the Labor Code, which reads as follows: "A contractor shall not discriminate in the employment of persons upon public works on any basis listed in subdivision (a) of Section 12940 of the Government Code, as those bases are defined in Sections 12926 and 12926.1 of the Government Code, except as otherwise provided in Section 12940 of the Government Code. Every contractor for public works who violates this section is subject to all the penalties imposed for a violation of this chapter."

5.05. EIGHT-HOUR DAY LIMITATION

(a) In accordance with the provisions of the Labor Code, and in particular, Sections 1810 to 1815 thereof, inclusive, eight hours labor shall constitute a day's work, and no worker, in the employ of said Contractor, or any Subcontractor, doing or contracting to do any part of the work contemplated by this Contract, shall be required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of those provisions; provided that subject to Labor Code section 1815, a worker may perform work in excess of either eight (8) hours per day or forty (40) hours during any one week upon

compensation for all hours worked in excess of eight (8) hours per day or forty (40) hours during any one week at not less than one and one-half times the basic rate of pay.

(b) The Contractor and each Subcontractor shall also keep an accurate record showing the names and actual hours worked of all workers employed by them in connection with the Work. This record shall be open at all reasonable hours to the inspection of the Library, State and Federal officers and agents. It is hereby further agreed that, the Contractor shall forfeit as a penalty to the Library the sum of twenty-five dollars (\$25) for each worker employed in the performance of this Contract by the Contractor or by any of its Subcontractors for each calendar day during which such worker is required or permitted to labor more than eight (8) hours in and one calendar day and forty (40) hours in any one calendar week in violation of Sections 1810 through 1815.

5.06. COMPLIANCE WITH STATE REQUIREMENTS FOR EMPLOYMENT OF APPRENTICES

The Contractor's attention is directed to Section 1777.5 of the Labor Code. Provisions of said section pertaining to employment of registered apprentices are hereby incorporated by reference into these Specifications. As applicable, the Contractor or any Subcontractor employed by the Contractor in the performance of the Work shall take such actions as necessary to comply with the provisions of Section 1777.5.

5.07. UNDERGROUND UTILITIES

(a) In accordance with Government Code section 4215, the Contractor shall be compensated for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating existing main or trunk line utility facilities which are not indicated in the Contract Plans and Specifications with reasonable accuracy, and for the equipment on the Project necessarily idled during such work, provided that the Contractor shall first notify the Library's Representative before commencing work on locating, repairing damage to, removing or relocating such utilities. Contractor shall not be assessed liquidated damages for delays in completing the Work when such delays are due to the failure of either the Library or the owner of the utility to provide for removal or relocation of such utility facilities.

(b) The Contractor shall take all precautions necessary to protect the existing utilities within the project area. Any utilities damaged due to the Contractor's negligence shall be repaired or restored to their original condition at the Contractor's sole expense. Existing utilities shall be kept in service during the life of the Contract unless relocation, reconstruction, abandonment, or outage is specifically authorized by the Library's Representative.

(c) The Contractor shall provide and maintain such temporary supports as may be necessary to preserve the functions of the various utility systems. No wires, conduits and/or pipes shall be removed until all services therein have been made inoperable.

(d) The Contractor shall notify the Library's Representative and appropriate Regional Notification Center for operators of subsurface installations at least two (2) working days, but not more than fourteen (14) calendar days, prior to performing excavation or other work close to any underground pipeline, conduit, duct, wire and other structures. The Contractor shall provide updated information to the Notification Center as required and on a periodic basis. The Regional Notification Center includes but is not limited to the Underground Service Alert-Northern California (USA) at 1-800-642-2444.

(e) The Contractor is advised that the State of California does not participate in USA. The Contractor is required to notify CalTrans Permits Branch (916) 322-1297 for the location of State facilities.

(f) The Contractor shall not proceed with work until utility facilities involved have been located, disconnected, or otherwise adjusted by utility representatives.

(g) The Library Utility Maintenance Division will make repairs to all water service laterals and water mains damaged by the Contractor during the course of construction unless directed otherwise by the Engineer. Except as otherwise provided in this section, the Contractor shall be required to pay all labor, material and equipment costs incurred by the Library Utilities Maintenance Division for the repairs made to damaged water service laterals and water mains. The Library will bill the Contractor for the repairs and the bills will be paid by the Contractor prior to either the next monthly progress payment or prior to the final payment, whichever comes first. The Contractor shall provide to the Engineer proof of payment of the repair bills prior to the issuance of either the monthly progress payment or final payment. The current labor and equipment rates for the Library Utility Maintenance Division will be made available to the Contractor at the preconstruction conference. The Library shall have the right to deduct the total amount of any unpaid Library repair bill from the money due or to become due the Contractor.

5.08. WATER POLLUTION

The Contractor shall exercise every reasonable precaution to protect streams, lakes, reservoirs, and canals from pollution with fuels, oils, bitumen's, calcium chloride, and other harmful materials and shall conduct and schedule Contractor's operations so as to avoid or minimize muddying and silting of said streams, lakes, reservoirs, and canals. Care shall be exercised to preserve vegetation beyond the limits of construction. The Contractor shall comply with Section 5650 of the California Fish and Game Code and all other applicable statutes and regulations relating to the prevention and abatement of water pollution.

5.09. PAYMENT OF TAXES

The Contract prices paid for the Work shall include full compensation for all taxes, which the Contractor is required to pay, whether imposed by federal, state, or local governments.

5.10. PERMITS AND LICENSES

The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the lawful prosecution of the work. All permits and licenses shall be obtained in sufficient time to prevent delays to the Work. The Contractor shall, at a minimum, possess and maintain the licenses and permits set forth in the Contract Provisions.

5.11. PATENTS

The Contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated into the Work, and agrees to indemnify, defend and save harmless the Library, the Engineer, and their duly authorized representatives, from all suits at law, or actions of every nature for, or on account of, the use of any patented materials, equipment, devices, or processes.

5.12. PUBLIC CONVENIENCE

This section defines the Contractor's responsibility with regard to convenience of the public and public traffic in connection with its operations.

(a) The Contractor shall so conduct its operations as to offer the least possible obstruction and inconvenience to the public. The Contractor shall have under construction no greater length or amount of work than can be properly prosecuted with due regard to the rights of the public.

(b) Unless otherwise provided in the Contract Documents, all public traffic shall be permitted to pass through the Work with as little inconvenience and delay as possible. In order to expedite the passage of public traffic through or around the work, the Contractor shall install as appropriate signs, lights, flares, barricades, and other facilities for the sole convenience and direction of public traffic. Also, where directed by the Engineer, the Contractor shall provide and station competent flag persons whose sole duties shall consist of directing the movement of public traffic through or around the Work. The cost of furnishing and installing such signs, lights, flares, barricades, and other facilities, and the cost of providing and stationing such flag persons, all for the convenience and direction of public traffic, will be considered as included in the Contract price and no additional compensation will be allowed.

(c) Spillage resulting from hauling operations along or across any publicly traveled way shall be removed immediately by the Contractor at its expense.

(d) Construction operations shall be conducted in such a manner as to cause as little inconvenience as possible to abutting property owners.

(e) Convenient access to driveways, houses and buildings along the line of the work shall be maintained and temporary approaches to crossings or intersecting highways shall be provided and kept in good condition. When the abutting property owner's access across the right-of-way line is to be eliminated, or to be replaced under the Contract by other access facilities, the existing access shall not be closed until the replacement access facilities are usable.

(f) Contractor shall supply water for the alleviation or prevention of dust nuisance as provided in the Contract Documents.

(g) Flag persons and guards, while assigned to traffic control, shall perform their duties and shall be provided with the necessary equipment in accordance with the current "Instructions to Flagmen" of the California Department of Transportation. The equipment shall be furnished and kept clean and in good repair by the Contractor at its expense.

(h) All traffic control shall be in accordance with California Manual on Uniform Traffic Control Devices (California MUTCD), Part 6 and this Section 5.12.

(1) Traffic Control Plans

Traffic Control Plans shall be developed for the project to assure that adequate consideration is given to the safety and convenience of motorists, pedestrians, and workers during construction. The Traffic Control Plans shall include, but not be limited to, signing, pavement markings, construction scheduling, permanent barricades, methods and devices for delineation and channelization, placement and maintenance of devices, roadway lighting, traffic regulations, surveillance and inspection. The Traffic Control Plans shall be

approved by the Engineer a minimum of two (2) working days prior to start of any work. Non-compliance with any stipulation of this section will be justification for the Library to stop work.

(2) Traffic Control Devices and Procedures

Traffic control devices and procedures shall conform to the California Manual on Uniform Traffic Control Devices (California MUTCD), Part 6 and this Section 5.12. Non-compliance with any stipulation of this section will be justification for the Library to stop work.

(3) Measurement and Payment

Unless specifically shown as an item of work on the proposal form, all traffic control shall be considered included in other items of work and no additional compensation will be made for labor, materials or equipment needed.

5.13. CONTINUOUS OPERABILITY OF FACILITIES

Absent written permission by the Library, the continuous operation of all existing facilities is required and shall in no way be affected by the Work.

5.14. SAFETY

(a) General

- (1) The Contractor shall be solely and completely responsible for the conditions of the job Site, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to all applicable federal, state, and local laws, ordinances, and codes, and to the rules and regulations established by the California Division of Industrial Safety, and to other rules of law applicable to the Work.
- (2) The services of the Library's Representative or Architect in conducting construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's work methods, equipment, bracing or scaffolding or safety measures, in, on, or near the construction site, and shall not be construed as supervision of the actual construction nor make the Library's Representative, Architect or the Library responsible for providing a safe place for the performance of work by the Contractor, Subcontractors, or suppliers; or for access, visits, use work, travel or occupancy by any person.
- (3) The Contractor shall carefully instruct all personnel working in potentially hazardous work areas as to potential dangers and shall provide such necessary safety equipment and instruction as is necessary to prevent injury to personnel and damage to property. Special care shall be exercised relative to electrical work, work involving excavation and in sump pump work.
- (4) All work and materials shall be in strict accordance with all applicable State, Federal and local laws, rules, regulations, and codes.

- (5) Nothing in this Contract is to be construed to permit work not conforming to governing law. When Contract Documents differ from governing law, the Contractor shall furnish and install the higher standards called for without extra charge. All equipment furnished shall be grounded and provided with guards and protection as required by safety codes. Where vapor-tight or explosion-proof electrical installation is required by law, this shall be provided.
 - (6) The Contractor shall submit a safety plan and/or narrative description to the Library's Representative prior to commencement of the Work. This safety plan and/or narrative description shall describe all first aid, safety clothing, etc. to be used at the Project Site.
- (b) Shoring and Trench Safety Plan
- (1) Attention is directed to Section 832 of the Civil Code of the State of California relating to lateral and subjacent support, and the Contractor shall comply with this law.
 - (2) In accordance with Section 6705 of the State Labor Code, the Contractor shall submit to the Library specific plans to show details of provisions for worker protection from caving ground. Not less than thirty (30) days before beginning excavation for any trench or trenches five feet or more in depth required under this Contract, the Contractor shall furnish to the Library's Representative working drawings of its trench safety plan. The trench safety plan working drawings shall be detailed plans showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground. If such plan varies from the shoring system standards established by the Construction Safety Orders of the California Division of Industrial Safety or the Federal Safety and Health Regulations for Construction of the Occupational Safety and Health Administration, Department of Labor, the plan shall be prepared by a registered civil or structural engineer. In no event shall the Contractor use a shoring, sloping, or protective system less effective than that required by said Construction Safety Orders, or less effective than that required by said Federal Safety Standards. Submission of this plan in no way relieves the Contractor from the requirement to maintain safety in all operations performed by the Contractor or its Subcontractors.

5.15. BLASTING

Except for exceptional circumstances, blasting shall be prohibited. Accordingly, Bids should be prepared on the basis that no blasting will be permitted. Should blasting be required and expressly approved by the Library, the Library will issue a Change Order for blasting work.

5.16. INTOXICATING LIQUORS AND NARCOTICS

The Contractor shall not sell, permit or suffer the introduction or use of intoxicating liquors or narcotics upon or about the Site.

5.17. PROTECTION OF PERSONS AND PROPERTY

(a) The Contractor shall take whatever precautions are necessary to prevent damage to all existing improvements, including above ground and underground utilities, trees, shrubbery that is not specifically shown to be removed, fences, signs, mailboxes, survey markers and monuments, buildings, structures, the Library's property, adjacent property, and any other improvements or facilities within or adjacent to the work. If such improvements or property are injured or damaged by reason of the Contractor's operations, they shall be replaced or restored, at the Contractor's expense, to a condition at least as good as the condition they were in prior to the start of the Contractor's operations.

(b) The Contractor shall adopt all practical means to minimize interference to traffic and public inconvenience, discomfort or damage. The Contractor shall protect against injury to any pipes, conduits or other structures crossing the trenching or encountered in the Work and shall be responsible for any injury done to such pipes or structures, or damage to property resulting therefrom. The Contractor shall support or replace any such structures without delay and without any additional compensation to the entire satisfaction of the Library. All obstructions to traffic shall be guarded by barriers illuminated at night. The Contractor shall be responsible for all damage to persons and property directly or indirectly caused by its operations and, under all circumstances, Contractor must comply with the laws and regulations of the State of California relative to safety of persons and property and the interruption of traffic and the convenience of the public within the respective jurisdictions.

(c) The Contractor is cautioned that it must replace all improvements in rights-of-way and within the public streets to a condition at least equal to what existed prior to the Contractor's entry onto the job.

(d) Type and time of construction required at any road subject to interference by the work will be determined by those authorities responsible for maintenance of said road. It shall be the responsibility of the Contractor to determine the nature and extent of all such requirements, including provision of temporary detours as required; however, the construction right-of-way obtained by the Library at affected roadways will be adequate for provision of all required detours. As required at any road crossing, the Contractor shall provide all necessary flag persons, guardrails, barricades, signals, warning signs and lighting to provide for the safety of existing roads and detours. Immediately after the need for temporary detours ceases, or when directed, the Contractor shall remove such detours and perform all necessary cleanup work, including replacement of fences, and removal of pavement. Included shall be all necessary replacement of existing roadway appurtenances, grading work, soil stabilization and dust control measures, as required and directed.

(e) The Contractor shall examine all bridges, culverts, and other structures over which it will move its materials and equipment, and before using them, Contractor shall properly strengthen such structures where necessary. The Contractor shall be responsible for any and all injury or damage to such structures caused by reason of its operations.

5.18. RESPONSIBILITY FOR REPAIR OF FACILITIES

All public or private facilities, including but not limited to, gravel surfacing at existing canals, structures, telephone cables, roadways, curbs, gutters, parking lots, private drives, levees and embankments for creeks, ponds and reservoirs disturbed during construction of the work shall be repaired and/or replaced by the Contractor to match facilities existing prior to construction.

In addition, the Contractor shall be responsible for any settlement damage to such facilities or adjoining areas for a period of one year after acceptance of such required facilities.

5.19. LIBRARY'S REPAIR

In the event the Contractor refuses or neglects to make good any loss or damage for which it is responsible under this Contract, the Library may itself or by the employment of others, make good any such loss or damage, and the cost and expense of doing so, including any reasonable engineering, legal and other consultant fees, and any costs of administrative and managerial services, shall be charged to the Contractor. Such costs and expenses may be deducted by the Library from claims for payment made by the Contractor for work completed or remaining to be completed.

5.20. ANTITRUST CLAIM ASSIGNMENT

In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to this contract, the Contractor and all subcontractors shall offer and agree to assign to the Library 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 subcontract. This assignment shall be made and become effective at the time the Library tenders final payment to the Contractor, without further acknowledgement by the parties.

5.21. WAIVER OF RIGHT TO RESCIND FOR MATERIAL BREACH

The Contractor agrees that it can be adequately compensated by money damages for any breach of this Contract which may be committed by the Library and hereby agrees that no default, act, or omission of the Library or the Engineer, shall constitute a material breach of the Contract entitling the Contractor to cancel or rescind the provisions of this Contract or (unless the Library shall so consent or direct in writing) to suspend or abandon performance of all or any part of the Work. The Contractor hereby waives any and all rights and remedies to which it might otherwise be or become entitled, save only its right to money damages.

5.22. CONTRACTOR'S LICENSE NOTICE

CONTRACTORS ARE REQUIRED BY LAW TO BE LICENSED AND REGULATED BY THE CONTRACTORS' STATE LICENSE BOARD. ANY QUESTIONS CONCERNING A CONTRACTOR MAY BE REFERRED TO:

REGISTRAR CONTRACTORS' STATE LICENSE BOARD
9821 BUSINESS PARK DRIVE
SACRAMENTO, CALIFORNIA 95827
MAILING ADDRESS: P.O. BOX 26000
SACRAMENTO, CALIFORNIA 95826

5.23. HISTORICAL, SCIENTIFIC AND ARCHEOLOGICAL DISCOVERIES

All articles of historical or scientific value, including but not limited to coins, fossils, and articles of antiquity which may be uncovered by the Contractor during the progress of work, shall become Library property. Such findings shall be reported immediately to the Library's Representative who will determine the method of removal, where necessary, and the final disposition thereof.

5.24. INSURANCE

Contractor shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property, which may arise from or in connection with the performance of the Work hereunder by the Contractor, its agents, representatives, employees or subcontractors. The cost of such insurance shall be included in the Contractor's bid.

(a) Neither the Contractor nor any Subcontractors shall commence any work until all required insurance has been obtained at their own expense. Such insurance must have the approval of the Library as to limit, form, and amount, and shall be placed with insurers with a current A. M. Best's rating of no less than A-VII.

(b) Any insurance bearing on adequacy of performance shall be maintained after completion of the project for the full guarantee period.

(c) Prior to execution of the Contract, the Contractor shall furnish the Library with original endorsements effecting coverage for all policies required by the Contract. The endorsements shall be signed by a person authorized by the insurer to bind coverage on its behalf. The endorsements are to be on forms provided or approved by the Library. The Library may require the Contractor or any subcontractor to furnish complete certified copies of all insurance policies affecting the coverage required by the Contract.

(d) All of the Contractor's policies shall contain an endorsement providing that written notice shall be given to the Library at least sixty (60) calendar days prior to termination, cancellation, or reduction of coverage in the policy.

(e) Any policy or policies of insurance that the Contractor elects to carry as insurance against loss or damage to its construction equipment and tools shall include a provision therein providing a waiver of the insurer's right to subrogation against the Library and the Engineer.

(f) The requirements as to the types, limits, and the Library's approval of insurance coverage to be maintained by the Contractor are not intended to and shall not in any manner limit or qualify the liabilities and obligations assumed by the Contractor under the Contract.

(g) In addition to any other remedy the Library may have, if the Contractor or any of the subcontractors fails to maintain the insurance coverage as required in this section, the Library may obtain such insurance coverage as is not being maintained, in form and amount substantially the same as required herein, and the Library may deduct the cost of such insurance from any amounts due or which may become due the Contractor under this Contract.

(h) The Contractor and all Subcontractors shall, at their expense, maintain in effect at all times during the performance of work under the Contract not less than the following coverage and limits of insurance, which shall be maintained with insurers and under forms of policy satisfactory to the Library. The maintenance by the Contractor and all Subcontractors of the following coverage and limits of insurance is a material element of this Contract. The failure of the Contractor or any Subcontractor to maintain or renew coverage or to provide evidence of renewal may be treated by the Library as a material breach of this contract.

(1) Workers' Compensation and Employer's Liability Insurance

(i) Workers' Compensation

The Contractor and all Subcontractors shall maintain insurance to protect the Contractor or subcontractor from all claims under Workers' Compensation and Employer's Liability Acts, including Longshoremen's and Harbor Workers' Act. Such coverage shall be maintained, in type and amount, in strict compliance with all applicable State and Federal statutes and regulations. The Contractor shall execute a certificate in compliance with Labor Code section 1861, on the form provided in the Contract Documents.

(ii) Claims Against Library

If an injury occurs to any employee of the Contractor or any of the Subcontractors for which the employee or its dependents, in the event of its death, may be entitled to compensation from the Library under the provisions of the said Acts, or for which compensation is claimed from the Library, there will be retained out of the sums due the Contractor under this Contract, an amount sufficient to cover such compensation as fixed by said Acts, until such compensation is paid or it is determined that no compensation is due. If the Library is required to pay such compensation, the amount so paid will be deducted and retained from such sums due, or to become due, the Contractor.

(2) Commercial General and Automobile Liability Insurance

The Contractor shall maintain in effect at all times during the performance of the work hereunder not less than the following coverage's and limits of Commercial General and Automobile Liability insurance:

(i) Form and Amount

The insurance shall include, but shall not be limited to, protection against claims arising from death, bodily injury, personal injury, or damage to property resulting from actions, failures to act, operations or equipment of the insured, or by its employees, agents or consultants, or by anyone directly or indirectly employed by the insured. The amount of insurance coverage shall not be less than \$1,000,000 per occurrence with an aggregate no less than two (2) times the required per occurrence limit applying to bodily injury, personal injury, and property damage, or any combination of the three. Any deductibles must be declared to and approved by the Library. At the option of the Library, either: the insurer shall reduce or eliminate such deductibles as respects the entity, its officers, officials, employees and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration expenses, and defense expenses.

The commercial general and automobile liability insurance coverage shall also include the following:

(ii) Additional Requirements

Provision or endorsement naming the Library, the Library's Representative, Architect and its consultants, and each of their officers, employees, and agents, each as additional insured's with respect to any potential liability arising out of the performance of any work under the Contract, and providing that such insurance is primary insurance as respects the interest of the Library the Library's Representative, Architect, and its consultants, and each of their officers, employees, and agents and that any other insurance, risk pool membership, or other liability protection maintained by the Library or maintained by the Architect is excess to the insurance required hereunder, and will not be called upon to contribute to any loss unless and until all limits available under the contractor's and subcontractor's insurance policy/policies have been paid. The additional insured coverage under the Contractor's policy shall be "primary and non-contributory" and will not seek contribution from the Library's insurance or self-insurance and shall be at least as broad as CG 20 01 04 13.

(iii) "Cross Liability" or "Severability of Interest" clause.

(iv) Broad Form Property Damage, Personal Injury, Contractual Liability, Protective Liability, and Completed Operations coverage's, and elimination of any exclusion regarding loss or damage to property caused by explosion or resulting from collapse of buildings or structures or damage to property underground, commonly referred to by insurers as the "XCU" hazards.

(v) Provision or endorsement stating that such insurance, subject to all of its other terms and conditions, applies to the liability assumed by the Contractor under the Contract, including, without limitation, that set forth in Section 5.25, Indemnity and Litigation Costs.

(vi) Provision or endorsement stating that any failure to comply with reporting or other provisions of the policies, including breaches of warranties, shall not affect coverage provided to the Library, its officers, officials, employees, or volunteers.

(vii) The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

(3) Builder's Risk or Installation Floater "All-Risk" Insurance

Before commencement of the Work, the Contractor shall submit written evidence that it has obtained for the period of the Contract, Builder's Risk "All-Risk" Completed Value Insurance and/or Inland Marine "All-Risk" Installation Floater Insurance, as may be applicable, upon the entire project which is the subject of this Contract, including completed work and work in progress. The policy or policies of insurance shall name the Contractor, Library, and Engineer as insured's as their respective interests may appear, and shall include an insurer's waiver of subrogation rights in favor of each. Such insurance may have a deductible clause, but the amount of the deductible shall be subject to

the approval of the Library, except that the deductible on earthquake coverage may be in accordance with the underwriter's requirements.

5.25. INDEMNITY AND LITIGATION COST

(a) Promptly upon execution of the Contract, the Contractor specifically obligates itself and hereby agrees to protect, hold free and harmless, defend and indemnify the Library, the Library's Representative, Architect and its consultants, and each of their officers, employees and agents, from any and all liability, penalties, costs, losses, damages, expenses, causes of action, claims or judgments, including attorney's fees, which arise out of or are in any way connected with the Contractor's, or its subcontractors' or suppliers', performance of work under this Contract or failure to comply with any of the obligations contained in the Contract. This indemnity shall imply no reciprocal right of the Contractor in any action on the contract pursuant to California Civil Code section 1717 or section 1717.5. To the fullest extent legally permissible, this indemnity, defense and hold harmless agreement by the Contractor shall apply to any and all acts or omissions, whether active or passive, on the part of the Contractor or its agents, employees, representatives, or Subcontractor's agents, employees and representatives, resulting in claim or liability, irrespective of whether or not any acts or omissions of the parties to be indemnified hereunder may also have been a contributing factor to the liability, except such loss or damage which was caused by the active negligence, the sole negligence, or the willful misconduct of the Library.

(b) In any and all claims against the Library, the Library's Representative, Architect and each of their consultants, officers, employees and agents by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under this section shall not be limited in way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under Workers' Compensation statutes, disability benefit statutes or other employee benefit statutes.

5.26. PROTECTION OF WORK

(a) The Contractor shall be responsible for the care of all the Work until its completion and final acceptance. The Contractor shall, at its own expense, replace damaged or lost material and repair damaged parts of the Work or the same may be done at the Contractor's expense by the Library and the Contractor and its sureties shall be liable therefor. The Contractor shall make its own provisions for properly storing and protecting all material and equipment against theft, injury, or damage from any and all causes. Damaged material and equipment shall not be used in the Work. The Contractor shall take all risks from floods and casualties except as provided by law, and shall make no charge for the restoration of such portions of the work as may be destroyed or damaged by flood or other casualties or because of danger from flood or other casualties or for delays from such causes. The Contractor may, however, be allowed a reasonable extension of time on account of such delays, subject to the conditions herein before specified. The Contractor shall not be responsible for the cost, in excess of 5% of the contracted amount, of repairing or restoring damage to the Work, if the damage was proximately caused by an earthquake in excess of a magnitude of 3.5 on the Richter Scale or by tidal wave's; provided that the Work damaged was built in accordance with accepted and applicable building standards, and the plans and specifications of the Library.

(b) Contractor shall effectively secure and protect adjacent property and structures, livestock, crops and other vegetation. If applicable, the Contractor shall open fences on or crossing the right-of-way and install temporary gates of sound construction thereon so as to

prevent the escape of livestock. Adjacent fence posts shall be adequately braced to prevent the sagging or slackening of the wire. Before such fences are opened, the Contractor shall notify the owner or tenant of the property and, where practicable, the opening of the fence shall be in accordance with the wishes of said owner or tenant. The Contractor shall be responsible that no loss or inconvenience shall accrue to the owner or tenant by virtue of their fences having been opened or the gate not having been either shut or attended at all times. Where special types of fences are encountered, the Contractor shall install temporary gates made of similar materials and of suitable quality to serve the purposes of the original fences. In all cases where the Contractor removes fences to obtain workroom, the Contractor shall provide and install temporary fencing as required, and on completion of construction shall restore the original fence to the satisfaction of the Library's Representative. All costs of providing, maintaining and restoring gates and fencing shall be home by the Contractor. The Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for protection required by public authority or local conditions.

(c) The Contractor shall use extreme care during construction to prevent damage from dust to crops and adjacent property. The Contractor, at its own expense, shall provide adequate dust control for the right-of-way and take other preventative measures as directed by the Engineer.

(d) The Contractor shall be responsible for all damage to any property resulting from trespass by the Contractor or its employees in the course of their employment, whether such trespass was committed with or without the consent or knowledge of the Contractor.

(e) The Contractor shall see that the Site is kept drained and free of all ground water and any other water, which may impede the progress or execution of the Work.

(f) The Contractor shall be responsible for any damage caused by drainage or water runoff from construction areas and from construction plant areas.

(g) In an emergency affecting the safety of life, the Work, or adjoining property, the Contractor, without special instruction or authorization from the Library is hereby permitted to act at its discretion to prevent such threatened loss or injury, and the Contractor shall so act without appeal if so instructed or authorized. Any compensation claimed by the Contractor on account of emergency work shall be determined as specified under Section 2.07. Should the Library, deem an emergency condition to exist, the Contractor shall immediately do those things and take those steps ordered by the Library. The decision of the Library in this respect shall be final and conclusive. Any claims for compensation made by the Contractor on account of emergency work shall be determined as specified under Section 2.07.

(h) Except as provided by Government Code section 4215, the Contractor shall be responsible for the removal, relocation and protection of all public and private utilities, including irrigation facilities in the nature of utilities, located on the site of the construction project if and to the extent that the same are identified in the Contract Documents, and the Contractor shall not be entitled to any extension of time or claim for damages for extra compensation in connection therewith. If and to the extent that such utilities or facilities are not identified in the Contract Documents, as between the Contractor and the Library, the Library will be responsible for the cost of their removal, relocation or protection, as the case may be, but the Contractor shall perform any such work in conformance with this Contract, if so directed by the Library. In such situations the Contractor shall not be responsible for delay in completion of the project caused by the failure of the Library or the owner of the utility to provide for such removal or relocation. If the Contractor, while performing the Contract, discovers utility or irrigation facilities

not identified by the Library in the Contract Documents, the Contractor shall immediately notify the Library in writing.

(i) Subject to the provisions of this section, where the Work to be performed under the Contract crosses or otherwise interferes with existing streams, watercourses, canals, farm ditches, pipelines, drainage channels, or water supplies, the Contractor shall provide for such watercourse or pipelines and shall perform such construction during the progress of the Work so that no damage will result to either public or private interests, and the Contractor shall be liable for all damage that may result from failure to so provide during the progress of the Work.

5.27. ACCIDENTS

(a) The Contractor shall provide and maintain, in accordance with Labor Code section 6708 and OSHA requirements, adequate emergency first-aid treatment for its employees and anyone else who may be injured in connection with the Work.

(b) The Contractor shall promptly report in writing to the Library's Representative all accidents whatsoever arising out of or in connection with, the performance of the Work, whether on or adjacent to the site, which caused death, personal injury, or property damage, giving full details and statements of witnesses. In addition, if death or serious injury or serious damage are caused, the accident shall be reported immediately by telephone or messenger to the Library and the Engineer.

(c) If any claim is made by anyone against the Contractor or any Subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Library's Representative, giving full details of the claim.

5.28. NO PERSONAL LIABILITY

Neither the Library, the Architect, nor any of their other officers, agents, or employees shall be personally responsible for any liability arising under the Contract, except such obligations as are specifically set forth herein.

SECTION 6
PROGRESS AND COMPLETION OF WORK

6.01. PROGRESS SCHEDULE

The Contractor shall submit within ten (10) days after execution of the Contract a detailed work schedule(s) which shall detail the actions of the Contractor and Subcontractors working at the Site. This schedule(s) shall both show the dates at which the Contractor will start and complete and conform to the completion time specified in the Contract. The controlling operation, defined as the least float path, if any, shall be identified.

The Contractor shall review, revise and resubmit the progress schedule at least once a month to reflect progress. In any event, Contractor shall submit, at any time during the contract period, a current schedule to the Library's Representative at the Library's Representative's request.

No progress payments will be made for any work performed until a satisfactory schedule has been submitted and approved by the Library's Representative. An updated schedule shall be required from the Contractor if the project falls ten (10) working days behind schedule.

If the Work falls behind the accepted schedule, the Contractor shall promptly take whatever actions are necessary to put the project back on schedule. For delays or portions of delays for which the Contractor is responsible, no payment will be made or time extension allowed for increase in work force, equipment, and working hours needed to put the project on schedule.

6.02. COMMENCEMENT AND PROGRESS OF THE WORK AND TIME OF COMPLETION

(a) Commencement

The Contractor shall begin the Work after receiving a Notice to Proceed within the period of time set forth in the Contract Provisions. Thereafter, Contractor shall diligently prosecute the Work to completion as specified in the Contract Documents. The Library's Representative shall have the right to specify the locations where Contractor shall start and proceed with the Work.

A preconstruction conference will be convened after the Contractor has delivered the necessary bonds, insurance certificates and signed agreement in proper form as required in the invitation to bid, bid proposal and general conditions of these specifications. Prior to any work, the Contractor shall provide the Library's Representative with a list of key personnel assigned to the project and the telephone numbers where they may be reached at any time. The list shall be made available in sufficient copies and presented at the preconstruction conference.

Notwithstanding any other provisions of the Contract, the Library shall not be obligated to accept or pay for any work furnished by the Contractor prior to the issuance of the Notice to Proceed whether or not the Library has knowledge of the furnishing of such work. The Contractor shall not commence with work on this project until its Contract bonds and evidence of insurance comply with all Contract requirements and a Notice to Proceed has been issued.

The Contractor shall notify the Library's Representative in writing two (2) working days (48 hours) prior to commencement of work on the Project or scheduling work for a Saturday, Sunday, or Library Holiday. Failure to provide said notification will void the Library's obligation to provide inspection. Any work done in the absence of the Library's Inspector shall be subject to rejection.

(b) Completion

All work under this Contract shall be completed within the period of time set forth in the Contract Provisions. The Contract shall be deemed completed when the Library has certified the completion of the Project as provided in Section 7.05.

6.03. SUSPENSION OF WORK

(a) The Library may at any time, by notice in writing to the Contractor, suspend any part of the Work for such period of time as may be necessary to prevent improper execution of the Work on the project by the Contractor, its Subcontractors or agents, and the Contractor shall have no claim for damages or additional compensation on account of any such suspension.

(b) The Library may at any time suspend any part or all of the Work upon ten (10) days written notice to the Contractor, who shall thereupon discontinue all work suspended except for all operations to prevent loss or damage to work already executed as may be directed by the Library. Work shall be resumed by the Contractor after such suspension on written notice from the Library.

(c) In the event of any suspension of the Work in whole or in part under subsection (B) above, the Contractor shall be entitled to an extension of time wherein to complete the Work to the extent of the delay caused to the Contractor thereby.

(d) In the event the entire work shall be suspended by order of the Library, as herein above provided, and shall remain so suspended for a period of sixty (60) consecutive days, through no fault of the Contractor, and notice to resume the Work shall not have been served on the Contractor as herein above provided, Contractor may, at its option, by written notice to the Library, terminate the Contract in the same manner as if the termination had been initiated by the Library, and the Library shall have no claim for damages because of such termination of the Contract.

6.04. DELAY IN THE WORK – TIME EXTENSIONS

The Contractor shall at all times employ such force, plant, materials, and tools as will be sufficient, in the opinion of the Library, to prosecute the Work at not less than the rates fixed under the terms of the Contract and to complete the Work thereof within the time limits fixed therein. If the Contractor refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will ensure the completion within the time specified in the Contract, or any extension thereof, or fails to complete said work within such time, the Library may exercise the termination provisions set forth in Section 6.06, below.

(a) Excusable Delays. Excusable delays shall be delays in the controlling operation of the Contractor's work due to strikes, lockouts by others, fire, unusual delay in transportation, unavoidable casualties, adverse weather conditions which could not have been reasonably anticipated, or any other act(s) of God beyond the Contractor's control, or by delay authorized by the Library, or by any cause which the Library shall decide to justify the delay. Except as

provided in Section 6.04(f), below, in the event of an excusable delay, the time of completion shall be extended for such reasonable time as the Library may decide. The Contractor's right to an extension of time for an excusable delay is expressly subject to Contractor's giving written notice of such claim within ten (10) days following the date the Contractor knew or should have known of the delay. Failure to give such notice shall be construed as a waiver of such right. It is understood and agreed that extensions of time shall be the Contractor's sole and exclusive remedy for excusable delays.

(b) Compensable delays. Compensable delays shall be delays in the controlling operating of the Contractor's work due to acts or neglect of the Library, its employees or those under it by contract or otherwise, or by changes ordered in the work. In the event of a compensable delay, the time of completion shall be extended for such reasonable time as the Library may decide. In addition, the Contractor may recover its direct costs as provided in Section 6.05. The Contractor's remedies for compensable delays are expressly subject to Contractor's giving ten (10) days written notice of such claim from the date the Contractor knew or should have known of the delay. It is understood and agreed that the Contractor's sole and exclusive remedies for compensable delays shall be an extension of the time and recovery of its direct costs as compensable hereunder, but only in accordance with the provisions of the Contract Documents.

(c) Contractor and Library understand and agree that the Contract time for the completion of this project is a very important part of the contract. Extensions of time will only be granted as provided above when events actually cause the Contractor to be delayed in the performance of that schedule activity which is the controlling operation as of the time of the delay. When acts or omissions occur which could cause delay, Contractor will take all reasonable means in order to be able to continue to work as scheduled without any delay, or as short a delay as possible. Additionally, if inclement weather causes accumulation of standing water on the work site or other conditions which might cause delay, Contractor shall take all measures reasonably necessary to permit work to continue as quickly as possible.

(d) If adverse weather conditions are the basis for a claim for additional time, such claim shall be documented by date 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 scheduled construction. Adverse weather conditions shall be considered only as those conditions that exceed the average annual number of rain days and rain quantities as established by the Annual Local Climatological Summary and NOAA National Technical Memorandum NWS WR-65 (Revised) as published by the United States Government, National Weather Service, National Climate Center, Asheville, North Carolina.

(e) The Library shall be responsible for determining when adverse weather conditions result in non-workable days. It shall be the Contractor's duty to stay informed of such determinations by the Library. The Contractor may object to such adverse weather determinations by filing with the Engineer a written notice of objection. The notice of objection shall state the basis of the objection and provide supporting documentation, which substantiates 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 scheduled construction. All such notices of objection shall be filed within three (3) days of the day in dispute. It is hereby agreed that the Contractor's failure to submit a written notice of objection

within three (3) days of the Library's adverse weather determination shall constitute a waiver by the Contractor of all its rights to further protest, judicial or otherwise.

(f) The Library will, within a reasonable period of time, issue a ruling on the Contractor's notice of objection. All such rulings by the Library shall be final, unless the Contractor files a written protest within fifteen (15) days of the Engineer's ruling. This protest shall clearly state the basis of the dispute. Such protest will be forwarded promptly to the Library, which will issue a decision on each such protest. The Library decision will be final. Pending the Library decision, the Contractor shall proceed with its work in accordance with the Library's ruling and/or instructions. It is hereby agreed that the Contractor's failure to file a protest within fifteen days (15) of the Library's ruling shall constitute a waiver by the Contractor of all its rights to further protest, judicial or otherwise.

(g) The number of days that are anticipated to be non-workable due to adverse weather conditions shall be []. Days deemed non-workable by the Library in excess of such anticipated number shall be considered excusable delays.

(h) Unexcused delays shall be delays in the Contractor's work due to acts or neglect of the Contractor, its employees, subcontractors or those under it by contract or otherwise. In the event of an unexcused delay, the Contractor expressly agrees that it shall not be entitled to either an extension of time or recovery of its costs.

(i) A request for an extension of time, or the granting of an extension of time, shall not constitute a basis for any claim against the Library for additional compensation or damages unless caused by the Library or another contractor employed by the Library.

6.05. DAMAGES FOR DELAY

In the event of compensable delay, the Library shall only be liable for idle equipment, idle workers and the necessary costs of transporting equipment. The Library shall be liable to the extent that the compensable delay is concurrent with excusable delays or contractor caused delays to the controlling operation. The allowable costs shall be as for force account work under Section 2.04 with the following exceptions:

(a) The Caltrans Delay Factor in the Labor Surcharge and Equipment Rental Rules applies to each equipment rental rate;

(b) The daily number of payable hours shall equal the normal working hours during the delay, not to exceed eight (8) hours per day; and

(c) No markups will be added.

6.06. TERMINATION FOR CONVENIENCE

If at any time before completion of the Work, the Library determines that it is either impossible or against the interests of the Library to complete the Work, or if the Work is stopped by an injunction of a court of competent jurisdiction or by order of any competent authority, the Library may, upon ten (10) days written notice to the Contractor, discontinue the Work and terminate the Contract. Upon service of such notice of termination, the Contractor shall discontinue the Work in such manner, sequence, and at such times as described below. The Contractor shall have no claim for damages for such discontinuance or termination, nor any claim for anticipated profits on the Work thus dispensed with, nor any other actually performed

up to the time of discontinuance, including any Extra Work ordered by the Engineer to be done, nor for any claim for liquidated damages.

Termination of the Contract for convenience and the total compensation payable to the Contractor in the event of termination shall be governed by the following:

(a) The Library will issue the Contractor a written notice signed by the Library, specifying that the Contract is to be terminated. Upon receipt of said written notice and, except as otherwise directed in writing by the Engineer, the Contractor shall:

- (1) Stop all Work under the Contract except that specifically directed to be completed prior to Acceptance.
- (2) Perform Work the Library deems necessary to secure the project for termination.
- (3) Remove equipment from the site of the Work.
- (4) Take such action as is necessary to protect materials from damage.
- (5) Notify all Subcontractors and suppliers that the Contract is being terminated and that their contracts or orders are not to be further performed unless otherwise authorized in writing by the Library.
- (6) Provide the Library with an inventory list of all material previously produced, purchased or ordered from suppliers for use in the Work and not yet used in the Work, including its storage location, and such other information as the Library may request.
- (7) Dispose of material not yet used in the Work as directed by the Library.

It shall be the Contractor's responsibility to provide the Library with good title to all materials purchased by the Library hereunder, including material for which partial payment has been made and with bills of sale or other documents of title for such materials.

- (8) Subject to the prior written approval of the Library, settle all outstanding liabilities and all claims arising out of subcontracts or orders for material terminated hereunder. To the extent directed by the Library, the Contractor shall assign to the Library all the right, title and interest of the Contractor under subcontracts or orders for materials terminated hereunder.
- (9) Furnish the Library with the documentation required to be furnished by the Contractor under the provisions of the Contract including, on projects as to which Federal funds are involved, all documentation required under the Federal requirements included in the Contract.
- (10) Take such other actions as the Library may direct.

(b) Termination of the Contract shall not relieve the Contractor of responsibility for damage to materials except as follows:

- (1) The Contractor's responsibility for damage to materials for which partial payment has been made and for materials furnished by the Library for use in the Work and unused shall terminate when the Library certifies that such materials have been stored in the manner and at the locations he or she has directed.
- (2) The Contractor's responsibility for damage to materials purchased by the Library subsequent to the issuance of the notice that the Contract is to be terminated shall terminate when title and delivery of such materials has been taken by the Library.
- (3) When the Library determines that the Contractor has completed the Work under the Contract directed to be completed prior to termination and such other Work as may have been ordered to secure the project for termination, he or she will recommend that the Library formally accept the Contract, and immediately upon and after such Acceptance by the Library, the Contractor will not be required to perform any further Work thereon and shall be relieved of his or her Contractual responsibilities for injury to persons or damage to property which occurs after the formal Acceptance of the project by the Library.

(c) The total compensation to be paid to the Contractor shall be determined by the Library on the basis of the following:

- (1) The reasonable cost to the Contractor, without profit, for all Work performed under the Contract, including mobilization, demobilization and Work done to secure the project for termination. Reasonable cost will include a reasonable allowance for project Overhead and general administrative Overhead not to exceed a total of seven (7%) percent of Direct Costs of such Work.
- (2) A reasonable allowance for profit on the cost of the Work performed as determined under Section 2.04(a), above, provided the Contractor establishes to the satisfaction of the Library that it is reasonably probable that he or she would have made a profit had the Contract been completed and provided further, that the profit allowed shall in no event exceed four (4%) percent of said cost.
- (3) The reasonable cost to the Contractor of handling material returned to the vendor, delivered to the Library or otherwise disposed of as directed by the Library.
- (4) A reasonable allowance for the Contractor's administrative costs in determining the amount payable due to termination of the Contract.

All records of the Contractor and the Subcontractors, necessary to determine compensation in accordance with this section shall be open to inspection or audit by representatives of the Library at all times after issuance of the notice that the Contract is to be terminated and for a period of three (3) years, and such records shall be retained for that period.

After Termination of the Work, by the Library, the Library may make payments on the basis of interim estimates pending issuance of the Final Statement, when in his or her opinion the amount thus paid, together with all amounts previously paid or allowed, will not result in total compensation in excess of that to which the Contractor will be entitled.

All payments, including payment upon the Final Statement, shall be subject to deduction for prior payments and amounts, if any, to be kept or retained under the provisions of the Contract.

- (d) The provisions of this section shall be included in all subcontracts.

6.07. TERMINATION FOR DEFAULT

(a) In the event of any default by the Contractor as described below, the Library may, after giving ten (10) days' written notice to the Contractor, terminate the Contractor's right to proceed with the Work or any part of the Work in the Library's sole discretion. Events of default include:

- (1) Failure or refusal to prosecute the Work, or any separable part thereof, with such diligence as will ensure the completion within the time specified in the Contract, or any extension thereof, or failure to complete said work within such time.
- (2) Filing of bankruptcy by the Contractor, or the making of a general assignment for the benefit of its creditors, or appointment of a receiver on account of Contractor's insolvency without discharge of the receiver within ten (10) days after its appointment.
- (3) Failure to make prompt payments to Subcontractors or suppliers.
- (4) Persistent disregard of laws, ordinances, or the instructions of the Engineer, or other substantial violation of any provision of the Contract.

(b) In the event the right of the Contractor to proceed with the Work, or any portion thereof, has been terminated because of the default of the Contractor and the Contractor has been given ten (10) days' notice to cure such fault and has not done so, the Library may take over the Work and prosecute the same to completion by contract or any other method the Library deems expedient, and may take possession of and utilize in completing the Work such materials, appliances, equipment and plant as may be on the site of the Work and necessary therefore. In such event, the Contractor and its sureties shall be liable for all damages including costs of managerial and administrative services, engineering, legal and other consultant fees, and liquidated damages sustained or incurred by the Library.

(c) Upon termination, the Contractor shall not be entitled to receive any further payment until the Work is finished. If upon completion of the Work the total cost to the Library, including engineering, legal and other consultant fees, costs of managerial and administrative services, construction costs, and liquidated damages shall be less than the amount which would have been paid if the Work had been completed by the Contractor in accordance with the terms of the Contract, then the difference shall be paid to the Contractor in the same manner as the final payment under the Contract. If the total cost incurred by the Library on account of termination of the Contract and subsequent completion of the Work by the Library by whatever method the Library may deem expedient shall exceed said amount which the Contractor would

otherwise have been paid, the Contractor and its sureties shall be liable to the Library for the full amount of such excess expense.

(d) The rights and remedies of the Library provided in this section are in addition to any of the rights and remedies provided by the law or under this Contract.

6.08. LIQUIDATED DAMAGES

(a) Liquidated Damages

(1) It is agreed by the parties to this Contract:

a) that time is of the essence;

b) In the event all the Work is not completed before or upon the expiration of the time limit as set in the Bid, Contract and/or Progress Schedule, or within any time extensions that may have been granted, damage will be sustained by the Library; and

c) that it may be impracticable to determine the actual amount of damage by reason of such delay.

Accordingly, it is agreed that the Contractor shall pay to the Library as damages the amount set forth for each and every day's delay in finishing the Work in excess of the number of days specified. Liquidated damages shall be paid at a rate of **one thousand dollars (\$1,000) per day** unless otherwise stated in the Contract Documents. The parties expressly agree that the liquidated damage clause found in the Contract Documents is reasonable under the circumstances existing at the time the Contract was made. The Library shall have the right to deduct the amount of liquidated damages from any money due or to become due the Contractor.

(2) In addition, the Library shall have the right to charge to the Contractor and to deduct from the final or progress payments for the Work the actual cost to the Library of legal, engineering, inspection, superintendence, and other expenses, which are directly chargeable to the Contract and which accrue during the period of such delay, except that the cost of final inspection and preparation of the final estimate shall not be included in the charges.

(b) Exclusions

The Contractor shall not be liable for liquidated damages or delays caused by the removal or relocation of utilities when such removal or relocation is the responsibility of the Library or the owner of the utility under Government Code section 4215.

6.09. CLEAN-UP

During the progress of the Work, the Contractor shall maintain the Site and related structures and equipment in a clean, orderly condition and free from unsightly accumulation of rubbish. All waste materials shall be removed daily from the Site and disposed of by the Contractor by any proper means at its own expense unless designated otherwise on the plans.

No waste materials shall be placed in the public street right-of-way. Unless otherwise specified, all existing piping, materials and/or equipment removed pursuant to this Contract shall become the Contractor's property.

Upon completion of the Work and before the final estimate is submitted, the Contractor shall, at its own cost and expense, remove from the vicinity of the Work all plants, buildings, rubbish, unused work materials, concrete forms, and temporary bridging and other like materials, belonging to the Contractor or used under the Contractor's direction during the construction, and in the event of the Contractor's failure to do so, the same may be removed by the Library after ten (10) calendar days' notice to the Contractor. Such removal shall be at the expense of the Contractor.

The Contractor shall use care in the removal of materials and equipment so as not to cause damage to existing facilities and structures. Contractor shall assume liability for all such damage. Where the construction has crossed yards or driveways, restoration shall be by the Contractor to the complete satisfaction of the Engineer, at the Contractor's expense.

The Contractor shall make its own arrangements for the disposal of waste materials. If the Contractor elects to dispose of such materials on private property, Contractor shall obtain written permission from all property owners involved.

SECTION 7
MEASUREMENT AND PAYMENT

7.01. SCOPE OF PAYMENT

(a) The Contractor shall accept the compensation provided in the Contract as full payment for furnishing all labor, materials, tools, equipment, and incidentals necessary to the completed work and for performing all work contemplated and embraced under the Contract; also for loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work until the acceptance by the Library and for all risks of every description connected with the prosecution of the Work, also for all expenses incurred in consequence of the suspension or discontinuance of the work as provided in the Contract; and for completing the Work according to the Specifications and Plans. Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material.

(b) No compensation will be made in any case for loss of anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as provided in such agreements.

(c) The Work includes the preparatory work and operations needed for mobilization and demobilization of the Project. The Work, however, does not include establishing the Engineer's field facility(s) of utility work and connections needed for these facilities.

7.02. PROGRESS PAYMENTS -

(a) The Library will pay the Contractor ninety-five percent (95%) of the amount of each progress estimate within thirty (30) days after receipt of an undisputed and properly submitted progress estimate from the Contractor, unless the Library has made a finding Prebid pursuant to Public Contract Code section 7201(b)(4) justifying a larger retention. If the Library fails to pay an undisputed progress estimate within the allotted thirty (30) days, the Library shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (A) of section 685.010 of the Code of Civil Procedure. Five percent (5%) of the amount of each estimate shall be retained by the Library until final completion and acceptance of all work under the Contract.

(b) **DRAFT APPLICATION FOR PAYMENT**

(1) One week prior to submitting the Application for Payment submit a marked-up copy of the previous Application for Payment showing the changes in progress that will be the basis for the new Application for Payment.

(c) **BILLING MEETINGS**

(1) A billing meeting shall be conducted by Library's Representative each month prior to submittal of the Application for Payment.

(2) Location: As designated by Library's Representative.

(3) Attending shall be:

- (i) Library's Representative.
- (ii) Contractor's Superintendent or Project Manager
- (iii) Subcontractors, as appropriate.
- (iv) Others, as appropriate.

(d) SCHEDULE OF VALUES

- (1) Coordination. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Contract Schedule and as directed by the Library's Representative.
 - (i) Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - (1) Contractor's Contract Schedule.
 - (2) Application for Payment form.
 - (3) List of Subcontractors
 - (4) Schedule of Alternates (if any).
 - (5) List of products (where/if appropriate).
 - (6) List of principal supplier and fabricators.
 - (7) Schedule of submittals.
 - (8) Construction Cost Breakdown Sheet.
- (2) Submit the Schedule of Values to the Library's Representative at the earliest feasible date, but in no case later than 7 days before the date scheduled for Submittal of the Initial Application for Payment.
- (3) Format and Content. Use the [Specification] [Project Manual] Table of Contents as a guide to establish the format for the Schedule of Values.
 - (i) Include the following Project identification on the Schedule of

Values:

- (1) Project name, number and location.
- (2) Name of the Library's Representative.
- (3) Project Number.
- (4) Contractor's name and address.
- (5) Date of Submittal.

- (4) Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
 - (i) Generic name.
 - (ii) Specification section.
 - (iii) Name of Subcontractor.
 - (iv) Name of manufacturer or fabricator.
 - (v) Name of supplier (if appropriate).
 - (vi) Change orders (numbers) that have affected value.
 - (vii) Dollar value. (Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.)
- (5) Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
- (6) Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
- (7) For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 - (i) Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.
- (8) Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work. Each item in the Schedule of Values and Application for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
 - (i) General Conditions Work Items, such as temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values.
- (9) Allowances (if applicable). Show the line item value of allowances.
- (10) Schedule of Values Updating. Update and resubmit the Schedule of Values prior to the next Application for Payment when Change Orders or contract directives result in a change in the Contract Sum.

(i) Each Change Order shall become a new line item.

(e) APPLICATIONS FOR PAYMENT

(1) No portion of an Application for Payment which includes a request for payment of a Change Order not yet fully executed will be approved by Library's Representative.

(2) Each Application for Payment shall be consistent with previous applications and payments as certified by the Library's Representative and paid for by the Library.

(i) The Initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

(ii) Entries shall match data on the Schedule of Values and the Contractor's Contract Schedule. Use updated Contract

(iii) Any payment request determined not to be a proper payment request suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) days, after receipt. A request returned pursuant to this section shall be accompanied by a document setting forth in writing the reasons why the payment request is not proper.

(iv) The number of days available to the Library to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the Library exceeds the seven-day return requirement set forth in

(v) When, in the judgment of the Library the Work is not proceeding in accordance with the provisions of the Contract, or when in the Library's judgment the total amount of the Work done since the last estimate amounts to less than one thousand dollars (\$1,000), no pay estimate will be prepared and no progress payment will be made.

(3) Payment Application Times. Unless otherwise agreed in writing, the date of each progress payment is indicated in the General Conditions. The period of Work covered by each Application for Payment shall be for the Work as indicated in the General Conditions.

(4) Submittal. Submit executed copy of the Application for Payment to the Library's Representative by means of ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when required.

(i) Transmit copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Library's Representative.

(ii) With each Application for Payment, submit lien release waivers of from every entity who may lawfully be entitled to file a lien arising out of the Contract, and related to the Work covered by the payment.

- (5) Initial Application for Payment for Construction Work. Administrative actions and submittals that must precede or coincide with submittal of the Initial Application for Payment for Construction Work include the following:
- (i) List of Subcontractors.
 - (ii) List of principal suppliers and fabricators.
 - (iii) Schedule of Values.
 - (iv) Contractor's updated Contract Schedule.
 - (v) Schedule of principal products.
 - (vi) Submittal Schedule (preliminary if not final).
 - (vii) Certificates of insurance and insurance policies.
 - (viii) 1Data needed to acquire Library's insurance.
- (6) Application for Payment at Substantial Completion. Following issuance of the Certification of Substantial Completion, submit an Application for Payment. This application shall reflect any certificates of Beneficial Occupancy issued previously for Library occupancy of designated portions of the Work. Administrative actions and submittals that shall precede or coincide with this application include:
- (i) Occupancy permits and similar approvals.
 - (ii) Warranties (guarantees) and maintenance agreements.
 - (iii) Test/adjust/balance records.
 - (iv) Maintenance instructions.
 - (v) Meter readings.
 - (vi) Start-up performance reports.
 - (vii) Change-over information for Library's occupancy, use, operation and maintenance.
 - (viii) Final progress photographs (if any).
 - (ix) List of incomplete Work, recognized as exceptions to Certificate of Substantial Completion.
 - (x) Final Cleaning.
 - (xi) Building Commissioning

- (xii) Final list of Contractor installed equipment, including total installed value (Equipment Schedule of Values).
- (7) Final Payment Application. Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
- (i) Completion of Project closeout requirements.
 - (ii) Completion of items specified for completion after Substantial Completion.
 - (iii) Assurance that unsettled claims will be settled.
 - (iv) Assurance work not complete and accepted will be completed without undue delay.
 - (v) Transmittal of required Project construction records to the Library.
 - (vi) Proof that taxes, fees and similar obligations have been paid.
 - (vii) Removal of temporary facilities and services.

7.03. PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS

A prime contractor or subcontractor shall pay any subcontractor not later than seven (7) days of receipt of each progress payment in accordance with the provisions in Section 7108.5 of the California Business and Professions Code concerning prompt payment to subcontractors. The seven (7) days is applicable unless a longer period is agreed to in writing. Any delay or postponement of payment over thirty (30) days may take place only for good cause and with the Library's prior written approval. Any violation of Section 7108.5 shall subject the violating contractor or subcontractor to the penalties, sanctions and other remedies of that section. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor. This provision applies to both DBE and non-DBE subcontractors.

7.04. LIENS AND STOP NOTICES

The Contractor agrees to keep the Work, the site of the Work and all monies held by the Library free and clear of all liens and stop notices related to labor and materials furnished in connection with the Work, if permitted by law. Furthermore, the Contractor waives any right it may have to file any type of lien or stop notice in connection with the Work. Notwithstanding anything to the contrary contained in the Contract Documents, if any such lien or stop notice is filed or there is evidence to believe that lien or stop notice may be filed at any time during the progress of the Work or within the duration of this Contract, the Library may refuse to make any payment otherwise due the Contractor or may withhold any payment due the Contractor a sum sufficient in the opinion of the Library to pay all obligations and expenses necessary to satisfy such lien or stop notice. The Library may withhold such payment unless or until the Contractor, within ten

days after demand therefor by the Library, shall furnish satisfactory evidence that the indebtedness and any lien or stop notice in respect thereof has been satisfied, discharged and released of record, or that the Contractor has legally caused such lien or stop notice to be released of record pending the resolution of any dispute between the Contractor and any person or persons filing such lien or stop notice. If the Contractor shall fail to furnish such satisfactory evidence within ten days of the demand therefor, the Library may discharge such indebtedness and deduct the amount thereof, together with any and all losses, costs and damages suffered or incurred by the Library from any sum payable to the Contractor under the Contract documents, including but not limited to final payment and retained percentage. This section shall be specifically included in all Subcontracts and purchase orders entered into by the Contractor.

7.05. FINAL ACCEPTANCE AND DATE OF COMPLETION

Whenever the Contractor shall deem all Work under this Contract to have been completed in accordance therewith, the Contractor shall so notify the Library in writing, and the Library shall promptly ascertain whether the Work has been satisfactorily completed and, if not, shall advise the Contractor in detail and in writing of any additional work required. When all the provisions of the Contract have been fully complied with, to the satisfaction of the Library, the Library shall proceed with all reasonable diligence to determine accurately the total value of all Work performed by the Contractor at the prices set forth in the Contract or fixed by Change Orders, and the total value of all extra work, all in accordance with the Contract. The Library will then certify to said final estimate and to the completion of the Work, and will file copies thereof with the Library and the Contractor, and shall cause of Notice of Completion to be filed with the Sonoma County Clerk-Recorder. The date of completion shall be the date of filing of the Notice of Completion. All guarantees, warranties, and securities securing said guarantees and warranties, shall commence on said date.

7.06. RIGHT TO WITHHOLD PAYMENTS

(a) In addition to all other rights and remedies of the Library hereunder and by virtue of the law, the Library may withhold or nullify the whole or any part of any partial or final payment to such extent as may reasonably be necessary to protect the Library from loss on account of:

- (1) Defective work not remedied, irrespective of when any such work be found to be defective;
- (2) Claims or liens filed or reasonable evidence indicating probable filing of claims or liens including, but not limited to claims under Sections 1775, 1776, or 1777.7 of the Labor Code;
- (3) Failure of the Contractor to make payments properly for labor, materials, equipment, or other facilities, or to subcontractors and/or suppliers;
- (4) A reasonable doubt that the Work can be completed for the balance then unearned;
- (5) A reasonable doubt that the Contractor will complete the Work within the agreed time limits;
- (6) Costs to the Library resulting from failure of the Contractor to complete the Work within the proper time; or

(7) Damage to work or property.

(b) Whenever the Library shall, in accordance herewith, withhold any monies otherwise due the Contractor, written notice of the amount withheld and the reasons therefor will be given the Contractor. After the Contractor has corrected the enumerated deficiencies, the Library will promptly pay to the Contractor the amount so withheld. When monies are withheld to protect the Library against claims or liens of mechanics, material men, Subcontractors, etc., the Library may at its discretion permit the Contractor to deliver a surety bond in terms and amount satisfactory to the Library, indemnifying the Library against any loss or expense, and upon acceptance thereof by the Library, the Library shall release to the Contractor monies so withheld.

7.07. FINAL PAYMENT

Within ten (10) days after the date of completion, the Library will file in the Office of the County Recorder, a Notice of Completion of the Work herein agreed to be done by the Contractor. Within sixty (60) days of completion defined in Public Contract Code section 7107, the difference between said final estimate and all payments theretofore made to the Contractor shall be due and payable to the Contractor, subject to any requirements concerning the furnishings of a maintenance bond, and excepting only such sum or sums as may be withheld or deducted in accordance with the provisions of this Contract. All prior certifications upon which partial Payments may have been made, being merely estimates, shall be subject to correction in the final certificate.

7.08. FINAL RELEASE

Final payment to the Contractor in accordance with the final estimate is contingent upon the Contractor furnishing the Library with a signed written release of all claims against the Library arising by virtue of the Contract. Disputed Contract claims in stated amounts may be specifically excluded by the Contractor from the operation of the release. The release shall be in substantially the form specified in California Civil Code section 8138.

SECTION 01 73 29 - CUTTING, PATCHING AND ALTERATION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work..
- C. Cutting and patching.
- D. Surveying for laying out the work.
- E. Cleaning and protection.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 74 19 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
- C. Section 02 41 13 - Selective Demolition: Demolition of portions of existing building as indicated.
- D. Section 07 84 00 - NTU Firestopping.
- E. Individual Product Specification Sections:
 - 1. Advance notification to other sections of openings required in work of those sections.
 - 2. Limitations on cutting structural members.

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

- A. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 - 1. On request, submit documentation verifying accuracy of survey work.
 - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
 - 3. Submit surveys and survey logs for the project record.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate Contractor.
6. Include in request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work and products to be used.
 - e. Effect on work of Owner or separate Contractor.
 - f. Written permission of affected separate Contractor.
 - g. Date and time work will be executed.

1.05 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.
- B. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
- C. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

1.06 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.

2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
- D. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- E. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Contractor shall locate and protect survey control and reference points.
- D. Control datum for survey is that indicated on drawings.
- E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- H. Utilize recognized engineering survey practices.
- I. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
- J. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and ____.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations, and ____.
- K. Periodically verify layouts by same means.
- L. Maintain a complete and accurate log of control and survey work as it progresses.
- M. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.
- B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

- D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 - 2. Remove items indicated on drawings.
 - 3. Relocate items indicated on drawings.
 - 4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.

2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 4. Verify that abandoned services serve only abandoned facilities.
 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
 3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
 4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:

1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 1. Complete the work.
 2. Fit products together to integrate with other work.
 3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material , to full thickness of the penetrated element.
- J. Patching:
 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish

entire unit.

2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site weekly and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
- G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- H. Prohibit traffic from landscaped areas.
- I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and Owner seven days prior to start-up of each item.

- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.12 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect and Owner.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Accompany Project Coordinator on Contractor's preliminary final inspection.
- H. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.14 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**PART 1 GENERAL****1.01 WASTE MANAGEMENT REQUIREMENTS**

- A. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- B. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- C. Comply with construction waste reduction, disposal and recycling requirements of the California Code of Regulations, Title 24, Part 11, the California Green Building Standards Code, CALGreen.
- D. Comply with more restrictive construction waste reduction, disposal and recycling requirements of the local Authority Having Jurisdiction (AHJ) where applicable.
- E. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean dimensional wood: May be used as blocking or furring.
 - 5. Land clearing debris, including brush, branches, logs, and stumps.
 - 6. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill.
 - 7. Bricks: May be used on project if whole.
 - 8. Concrete masonry units: May be used on project if whole, or crushed and used as sub-base material or fill.
 - 9. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 10. Glass.
 - 11. Gypsum drywall and plaster.
 - 12. Plastic buckets.
 - 13. Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed: DuPont (<http://flooring.dupont.com>) and Interface (www.interfaceinc.com) conduct reclamation programs.

- 14. Paint.
 - 15. Plastic sheeting.
 - 16. Rigid foam insulation.
 - 17. Windows, doors, and door hardware.
 - 18. Plumbing fixtures.
 - 19. Mechanical and electrical equipment including light fixtures and lamps.
 - 20. Acoustical ceiling tile and panels.
- F. Universal Waste as defined by The State of California Department of Toxic Substances Control (DTSC) may not be disposed of in landfills or by incineration.
- G. Methods of trash/waste disposal that are not acceptable are:
- 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
 - 5. Incineration, either on- or off-site.
- H. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Universal Waste: Batteries, electronic waste, and mercury-containing components as defined by the State of California Department of Toxic Substances Control (DTSC).
- Q. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

- A. CALGreen Submittals:
 - 1. Construction Waste Management (CWM) Plan for CALGreen 5.408.1 – Plan to recycle and/or salvage for reuse a minimum of **[65%] [HIGHER GOAL%]** of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.1, CALGreen 5.408.1.2 or CALGreen 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.
 - 2. Document compliance utilizing Compliance Forms provided by the State of California:
 - a. Construction Waste Management Plan
 - b. Construction Waste Management Worksheet
 - c. Construction Waste Management Acknowledgement
 - 3. California prohibited Universal Waste materials shall be diverted from landfills. Comply with the hazardous waste regulations (California. Code of Regulations, Title. 22, for the handling, transport and recycling in accordance with the universal waste regulations (UWR). Guidelines are available at the Universal Waste Rule link at:

<https://dtsc.ca.gov/universalwaste/>

- a. Universal wastes include:
 - 1) Electronic devices: Includes any electronic device that is a hazardous waste (with or without a Cathode Ray Tube (CRT)), including televisions, computer monitors, cell phones, VCR's, computer CPU's and portable DVD players.
 - 2) Batteries: Most household-type batteries, including rechargeable nickel-cadmium batteries, silver button batteries, mercury batteries, alkaline batteries and other batteries that exhibit a characteristic of a hazardous waste
 - 3) Electric lamps: Fluorescent tubes and bulbs, high intensity discharge lamps, sodium vapor lamps and electric lamps that contain added mercury, as well as ballasts, and any other lamp that exhibits a characteristic of a hazardous waste. (e.g., lead).
 - 4) Mercury-containing equipment: Thermostats, mercury switches, mercury thermometers, pressure or vacuum gauges, dilators and weighted tubing, mercury rubber flooring, mercury gas flow regulators, dental amalgams, counterweights, dampers and mercury added novelties such as jewelry, ornaments and footwear.
 - 5) CRTs: The glass picture tubes removed from devices such as televisions and computer monitors.
 - 6) CRT glass: A cathode ray tube that has been accidentally broken or processed for recycling.
 - 7) Non-empty aerosol cans
 - b. Verification must be submitted that Universal Waste items have been disposed of properly and diverted from landfills.
4. Excavated soil and land clearing debris:
 - a. 100% of trees, stumps, rocks, and associated vegetation and soils resulting from land clearing shall be reused or recycled.
 - 1) For a phased project, such material may be stockpiled on site until the storage site is developed.
 - 2) Re-use, either on or off-site, of vegetation or soil contaminated by disease or pest infestation is prohibited. If contamination is suspected, contact the County Agricultural Commissioner for direction.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. See Division 01 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Prebid meeting.
 - 2. Preconstruction meeting.
 - 3. Regular job-site meetings.
 - 4. Job safety meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. As a minimum, provide:
 - a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
 - b. Separate dumpsters for each category of recyclable.
 - c. Recycling bins at worker lunch area.
 - 2. Provide containers as required.
 - 3. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
 - 4. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if

possible.

5. Locate enclosures out of the way of construction traffic.
 6. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 7. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
 8. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. General requirements and procedures for compliance with the following:
 - 1. Forest Stewardship Council (FSC) Certified Wood.
 - 2. California Code of Regulation Title 24 Part 11 California Green Building Standards Code (CALGreen) Non-Residential Mandatory Measures.
 - 3. Construction Waste Management and Disposal including salvaging, recycling, and disposing of demolition and construction waste.
 - 4. Construction indoor air quality management.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 74 19 - Construction Waste Management and Disposal.

1.03 SUBMITTALS

- A. FSC Certified Wood: Submit product data and chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.
- B. CALGreen: Additional CALGreen submittal requirements are included in other sections of the Specifications.
 - 1. CALGreen submittals are in addition to other submittals. If documentation is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to demonstrate compliance with indicated CALGreen requirements.

PART 2 PRODUCTS**2.01 CERTIFIED WOOD**

- A. Not less than (50) percent (by cost) of wood-based materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
 - 1. Wood-based materials include but are not limited to the following materials when made from made wood, engineered wood products, or wood-based panel products:
 - a. Rough carpentry.
 - b. Miscellaneous carpentry.

- c. Finish carpentry.
- d. Architectural woodwork.
- e. Wood flooring.
- f. Wood cabinets.
- g. Non-rented temporary construction, including bracing, concrete formwork, pedestrian barriers, and temporary protection.

2.02 LOW-EMITTING MATERIALS

- A. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products as specified below.
- B. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

TABLE 5.504.4.1	
ADHESIVE VOC LIMIT (Notes 1,2)	
Less Water and Less Exempt Compounds in Grams Per Liter	
ARCHITECTURAL APPLICATIONS	CURRENT VOC LIMIT
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesive	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Drywall panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Other adhesive not specifically listed	50
SPECIALTY APPLICATIONS	
PVC welding	510

CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140
Top and trim adhesive	250
SUBSTRATE SPECIFIC APPLICATION	
Metal to metal	30
Plastic foams	50
Porous material (except wood)	50
Wood	30
Fiberglass	80
Notes	
1. If an adhesive is used to bond dissimilar substrates together the adhesive with the highest VOC content shall be allowed.	
2. For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168, http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF .	
TABLE 5.504.4.2	
SEALANT VOC LIMIT	
Less Water and Less Exempt Compounds in Grams per Liter	
SEALANTS	CURRENT VOC LIMIT
Architectural	250
Marine deck	760
Nonmembrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420
Note: For additional information regarding methods to measure the VOC content specified in these tables, see South Coast Air Quality Management District Rule 1168.	

- C. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3, shall be determined by classifying the coating as a Flat, Nonflat, or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.

- D. Aerosol paints and coatings. Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of California Code of Regulations, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

TABLE 5.504.4.3	
VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS (Notes 2, 3)	
Grams of VOC per Liter of Coating, Less Water and Less Exempt Compounds	
COATING CATEGORY	CURRENT LIMIT
Flat coatings	50
Nonflat coatings	100
Nonflat-high gloss coatings	150
SPECIALTY COATINGS	
Aluminum roof coatings	400
Basement specialty coatings	400
Bituminous roof coatings	50
Bituminous roof primers	350
Bond breakers	350
Concrete curing compounds	350
Concrete/masonry sealers	100
Driveway sealers	50
Dry fog coatings	150
Faux finishing coatings	350
Fire resistive coatings	350
Floor coatings	100
Form-release compounds	250
Graphic arts coatings (sign paints)	500
High temperature coatings	420
Industrial maintenance coatings	250
Low solids coatings (Note 1)	120
Magnesite cement coatings	450
Mastic texture coatings	100
Metallic pigmented coatings	500
Multicolor coatings	250
Pretreatment wash primers	420
Primers, sealers, and undercoaters	100
Reactive penetrating sealers	350
Recycled coatings	250
Roof coatings	50
Rust preventative coatings	250
Shellacs Clear	730

Shellacs Opaque	550
Specialty primers, sealers and undercoaters	100
Stains	250
Stone consolidants	450
Swimming pool coatings	340
Traffic marking coatings	100
Tub and tile refinish coatings	420
Waterproofing membranes	250
Wood coatings	275
Wood preservatives	350
Zinc-rich primers	340
Notes	
1. Grams of VOC per liter of coating, including water and including exempt compounds	
2. The specified limits remain in effect unless revised limits are listed in subsequent columns in the table.	
3. Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008. More information is available from the Air Resources Board.	

- E. Carpet systems. All carpet installed in the building interior shall meet at least one of the following testing and product requirements:
 - 1. Carpet and Rug Institute's Green Label Plus Program.
 - 2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2, January 2017 (also known as CDPH Standard Method V1.2 or Specification 01350).
 - 3. NSF/ANSI 140 at the Gold level or higher.
 - 4. Scientific Certifications Systems Sustainable Choice.
 - 5. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database.

- F. Carpet cushion. All carpet cushion installed in the building interior shall meet at least one of the following testing and product requirements:
 - 1. Carpet and Rug Institute's Green Label program.
 - 2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental

Chambers, Version 1.2, January 2017 (also known as CDPH Standard Method V1.2 or Specification 01350).

- G. Carpet adhesive. All carpet adhesive shall meet the requirements of Table 5.504.4.1.
- H. Resilient flooring systems. For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following :
 - 1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
 - 2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2, January 2017 (also known as CDPH Standard Method V1.2 or Specification 01350).
 - 3. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database; or
 - 4. Products certified under the UL GREENGUARD Gold (formerly the Greenguard Children & Schools program).
- I. Composite wood products. Hardwood plywood, particleboard, and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.). Those materials not exempted by the ATCM must meet the specified emission limits as shown in Table 5.504.4.5.

TABLE 5.504.4.5	
FORMALDEHYDE LIMITS (Note 1)	
Maximum Formaldehyde Emissions in Parts per Million	
PRODUCT	CURRENT LIMIT
Hardwood plywood veneer core	0.05
Hardwood plywood composite core	0.05
Particleboard	0.09
Medium density fiberboard	0.11
Thin medium density fiberboard (Note 2)	0.13
Notes	
1. Values in this table are derived from those specified by the California Air Resources Board, Air Toxics Control Measure for Composite Wood as tested in accordance with ASTM E1333. For additional information, see California Code of Regulations, Title 17, Sections 93120 through 93120.12.	
2. Thin medium density fiberboard has a maximum thickness of 5/16 inch (8 mm).	

- J. Thermal insulation shall comply with the requirements of the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2, January 2017 (Emission testing method for California Specification 01350).
1. See California Department of Public Health's website for certification programs and testing labs.
 2. Provide documentation verifying that thermal insulation materials meet the pollutant emission limits.
- K. Acoustical Ceilings and Wall Panels shall comply with the requirements of the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2, January 2017 (Emission testing method for California Specification 01350).
1. See California Department of Public Health's website for certification programs and testing labs.
 2. Documentation shall be provided verifying that acoustical finish materials meet the pollutant emission limits.

PART 3 EXECUTION

3.01 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with Section 01 74 19 - Construction Waste Management and Disposal.

3.02 POLLUTANT CONTROLS

- A. CALGreen Requirements:
1. Comply with CALGreen 5.504.3 regarding covering of duct openings and protection of mechanical equipment during construction
 2. At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system. .
 3. Comply with SMACNA Indoor Air Quality (IAQ) Guideline for Occupied Buildings under Construction if permanent heating, cooling, and ventilating systems are in use during selective demolition operations

3.03 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

- A. Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction.
1. If Owner authorizes the use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 1 Section "Temporary Facilities and

Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.

2. Replace all air filters immediately prior to occupancy. Replacement air filters shall have a MERV 13 according to ASHRAE 52.2.
3. Contractor must comply with the IAQ Management Plan that Contractor develop and submits. The Plan must meet the SMACNA guidelines referenced herein.

B. Flush Building :

1. Conduct a two-week building air flush-out after construction ends with new air filters and 100 percent outdoor air. Replace air filters after building air flush-out. Replacement air filters shall have a MERV 13 according to ASHRAE 52.2.

END OF SECTION

SECTION 02 41 13 - SELECTIVE DEMOLITION**PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes
 - 1. Selective demolition of building elements as indicated.
 - 2. Pollutant control measures.
 - 3. Protection of existing building finishes during demolition and construction, including, but not limited to, wood paneling and trim.
 - 4. Protection of fixed casework, and similar elements not indicated to be removed.
 - 5. Construction waste reduction, disposal, and recycling including required documentation for Construction Waste Management Plan and its implementation.
- B. Related Sections
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
 - 2. Section 01 74 19 - Construction Waste Management and Disposal: For procedures and documentation associated with demolition waste.
 - 3. Section 01 81 13 - Sustainable Design Requirements: For pollutant control and indoor air quality management during selective demolition operations.
 - 4. Division 22 - Plumbing: For demolition requirements as specified and as indicated on the Drawings.
 - 5. Division 23 - Heating, Ventilating, and Air Conditioning (HVAC): For demolition requirements as specified and as indicated on the Drawings.
 - 6. Division 26 - Electrical: For demolition requirements as specified and as indicated on the Drawings.

1.02 REFERENCES

- A. ANSI/ASSE - American National Standards Institute/American Society of Safety Engineers
 - 1. A10.6 - Safety Requirements for Demolition Operations.
- B. EPA - Environmental Protection Agency
- C. NFPA - National Fire Protection Association
 - 1. 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.03 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
 - 1. Storage or sale of removed items or materials on-site is not permitted.
- B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to the Owner's designated storage area.
- C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.
- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, at the Contractor's option and at no additional cost, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.
- E. Materials Ownership: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

1.04 SUBMITTALS

- A. CALGreen submittals: Refer to Section 01 74 19 - Construction Waste Management and Disposal for planning and documentation of construction waste resulting from demolition activities.
 - 1. Construction Waste Management Plan: Prepare and submit in accordance with CALGreen requirements.
 - 2. Construction Waste Management Worksheets: Prepare and submit in accordance with CALGreen requirements.
 - 3. Construction Waste Management Acknowledgment: Prepare and submit in accordance with CALGreen requirements.
- B. Schedule of selective demolition activities indicating the following:
 - 1. Interruption of utility services and security devices.
 - 2. Coordination for shutoff, capping, and continuation of utility services and security devices.
 - 3. Locations of temporary barricades, partitions, and means of egress.
 - 4. Above items shall be shown on Preliminary schedule, Final Schedule, and 3-week look aheads. Final dates of shutdowns are required no less than 10 days prior to activity in

a request to Program Manager in writing.

- C. Construction Logistics Plan indicating the following:
 - 1. Barricades and enclosures.
 - 2. Laydown and staging area.
- D. Inventory of items to be removed and salvaged.
- E. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.
 - 1. Wood paneling, ceilings, soffits, and trim not indicated to be removed.
- F. Record Drawings at Project Closeout: Identify and accurately locate capped utilities and other subsurface structural, electrical, plumbing, mechanical and security devices.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements
 - 1. Comply with governing EPA notification regulations before beginning selective demolition.
 - 2. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.
- C. Predemolition Conference: Conduct conference at Project site.

1.06 PROJECT CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by the Owner as far as practical.
- B. Portions of site immediately adjacent to selective demolition area will be occupied. Conduct selective demolition so Owner's operations will not be disrupted.
- C. Asbestos: If any previously unidentified materials suspected of containing asbestos are encountered, do not disturb the materials. Immediately notify the Architect and the Owner.

1.07 WARRANTIES

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

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped where indicated.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
 - 1. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated plumbing, mechanical, electrical, security, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.
- E. Survey the condition of the buildings to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structures during selective demolition.
- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES

- A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized by the Owner. Provide temporary services during interruptions to existing utilities, as acceptable to the Owner and to governing authorities.
 - a. Provide not less than 10 calendar days' notice to the Owner if shutdown of service is required during changeover.
 - 2. Sitework will affect existing irrigation services. Provide not less than 72 hours' notice to the Owner when shutdown of irrigation service is required during sitework. Temporarily reconnect irrigation service to maintain irrigation in operation during construction.
- B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving portions of the buildings or sitework to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with the Owner.

2. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit after bypassing.

3.03 PREPARATION

- A. Conduct demolition operations and remove debris to ensure minimum interference with streets, walks, and other adjacent occupied and used facilities.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction.
- B. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.
 1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by the Owner.
 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 3. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces to ensure that no water leakage or damage occurs to structure or interior areas.
 4. Protect walls, ceilings, floors, fixed audience seating, and other existing finish work that are to remain and are exposed during selective demolition and construction operations.
 - a. Exercise care to protect existing wood paneling and ceilings to remain.
 5. Cover and protect furniture, furnishings, and equipment that have not been removed.
- C. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
 1. Construct dustproof partitions of not less than nominal 4 inch studs and 1/2-inch fire retardant plywood on the demolition side; seal joints and perimeter.
 2. Non-plastic sheet materials shall be used to further mitigate dust and shall not trap moisture; seal to prevent dust penetration.
- D. Provide and maintain interior and exterior bracing or structural support to preserve stability and prevent movement, settlement, or collapse of portions of building to be selectively demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Owner, 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.

3.04 POLLUTANT CONTROLS

- A. CALGreen Requirements: Refer to Section 01 81 13 - Sustainable Design Requirements for requirements for temporary ventilation and pollutant control.
 - 1. Comply with CALGreen 5.504.3 regarding covering of duct openings and protection of mechanical equipment during construction
 - 2. At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, temporary or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system. .
 - 3. Comply with SMACNA Indoor Air Quality (IAQ) Guideline for Occupied Buildings under Construction if permanent heating, cooling, and ventilating systems are in use during selective demolition operations
- B. Use temporary enclosures and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
- C. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.
- D. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

3.05 SELECTIVE DEMOLITION

- A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to 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. To minimize disturbance of adjacent surfaces, use hand 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. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 10. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
- B. Demolish concrete in small sections. Cut concrete at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.

3.06 MANAGEMENT OF DEMOLISHED MATERIALS

- A. Recycle and/or salvage for reuse non-hazardous demolition waste in accordance with requirements of Section 01 74 19 - Construction Waste Management and Disposal. Remove from site all materials not to be reused on site.
- B. Store items to be salvaged and reinstalled in a secure and protected location until ready for reinstallation.
- C. Burning: Do not burn demolished materials.
- D. Refer to the Division 01 for procedures to follow when materials containing asbestos and lead are encountered.

3.07 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations.
- B. Return adjacent areas to condition existing before selective demolition operations began.
- C. Sweep the building broom clean on completion of selective demolition operation.

22212.00

Sonoma County Library
Healdsburg Library Refresh
139 Piper St

END OF SECTION

SECTION 03 05 16 - UNDERSLAB VAPOR RETARDER**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Sheet vapor barrier under concrete slabs on grade.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 03 10 00 - Concrete Formwork and Accessories.
- C. Section 03 20 00 - Concrete Reinforcing.
- D. Section 03 30 00 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.
- E. Section 09 05 61 - Common Work Results for Flooring Preparation: Preparation of concrete floor substrates to receive floor finishes.

1.03 REFERENCE STANDARDS

- A. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs; 2017.

1.04 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
 - 2. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- B. Product Data: Submit manufacturers' data on manufactured products.
- C. Test Data: Submit report of tests showing compliance with specified requirements.
- D. Samples: Submit samples of underslab vapor barrier to be used.
- E. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Underslab Vapor Barrier:
 - 1. Water Vapor Permeance: Not more than 0.010 perms, maximum as tested in accordance with mandatory conditioning tests per ASTM E1745
 - 2. Strength: Complying with ASTM E1745 Class A.
 - 3. Thickness: 15 mils.
 - 4. Basis of Design:
 - a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil):
www.stegoindustries.com/#sle.
 - 5. Acceptable Alternative:
 - a. Henry Corporation: Moistop Ultra 15 (15-mil).
 - b. W.R. Meadows: Perminator Class A (15 mil)
- B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams, perimeter edges, and penetrations in vapor barrier.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.
- B. Ensure that subgrade is level and compacted in accordance with requirements of the Geotechnical report and approved by Architect or Geotechnical Engineer.

3.02 INSTALLATION

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls, terminating at the top of the slab.
- C. Lay vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
- D. Extend vapor barrier to the perimeter of the slab.
- E. Lap joints minimum 6 inches.

- F. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
- G. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
- H. Repair damaged vapor retarder before covering with other materials.

END OF SECTION

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SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES**PART 1 GENERAL****1.01 SUMMARY**

- A. Section Includes: All labor, materials and equipment and all operations required to complete all formwork as indicated on the drawings; to produce shapes and configurations as shown, as required; and as specified herein, including:
1. Forms, shores, bracing, removal and other operations as necessary for all cast-in-place concrete and masonry placed.
 2. Setting and securing anchor bolts and other metal items embedded in concrete into formwork, using materials and layouts furnished and delivered to jobsite as specified under other sections.
- B. Related Sections:
1. Pertinent Sections of Division 03 specifying concrete construction.
 2. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete foundations and formwork.

1.02 REFERENCES

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 19 Concrete.
- B. American Concrete Institute (ACI) PRC-347 "Guide to Formwork for Concrete".
- C. American Plywood Association (APA) "Concrete Forming Guide".
- D. West Coast Lumberman Inspection Bureau (WCLIB) "Standard Grading Rules for West Coast Lumber".
- E. ACI MNL-066 "ACI Detailing Manual".
- F. ACI SPEC-301 "Specifications for Concrete Construction".
- G. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice".

1.03 DESIGN REQUIREMENTS

- A. Design, engineer, and construct formwork, shoring and bracing to conform to design and code requirements, resist imposed loads; resultant concrete to conform to required shape, line and dimension.

1.04 SUBMITTALS

- A. Limitation of review: Structural Engineer's review will be required only where specifically requested for general architectural applications and features only. Contractor is responsible for structural stability, load-resisting characteristics and sufficiency of form work design.

1.05 QUALITY ASSURANCE

- A. General: All form materials shall be new at start of work. Produce high quality concrete construction. Minimize defects due to joints, deflection of forms, roughness of forms, nonconforming materials, concrete or workmanship.
- B. Reuse of Forms: Plywood forms may be reused, if thoroughly cleaned of all dirt, mortar, and foreign materials, and undamaged at edges and contact face. Reuse shall be subject to permission from the Architect without exception, and issued in writing. Reuse of any panel which will produce a blemish on exposed concrete, will not be permitted.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Form Materials:
1. Non-Exposed Surface Formwork Facing: Forms for concrete which is not exposed to view, may be of plywood as specified for exposed surfaces, or square edge 1x nominal Douglas Fir, Construction Grade, S4S.
 2. Exposed Surface Formwork Facing:
 - a. Forms for all exterior and interior concrete flat surfaces unless otherwise specified as board formed shall be new Douglas Fir Plywood (APA) ply, 5/8-inch, B-B Plyform, Class 1, Exterior Type, oiled and edged and edge-sealed conforming to U.S. Product Standard PS 1 in large sheet sizes to achieve joint patterns shown.
 - b. All exposed concrete edges shall be chamfered 3/4" minimum or as noted on the drawings.
 3. Exposed Surface Formwork - Special Pattern Form Liner:
 - a. Forms for all exterior and interior concrete flat surfaces indicated shall be as designated by Architect.
- B. Earth Forms: Allowed, subject to soil standing in excavations without ravel or caving.
- C. Form Release Agent: Spray-on compound, not affecting color, bond or subsequent treatment of concrete surfaces. Maximum VOC content shall comply with local requirements and California Green Building Code.

- D. Accessories: Types recommended by manufacturers or referenced standards to suit conditions indicated;
 - 1. Anchors, spacers, void in-fill materials: sized to resist imposed loads.
 - 2. Form Ties: Prefabricated rod, flat band, or wire snap ties with 1" break-back or threaded internal disconnecting type with external holding devices of adequate bearing area. Ties shall permit tightening and spreading of forms and leave no metal closer than 1" to surface.
- E. Corner Chamfers and Rustications: Filleted, wood strip or foam type; sizes and shapes as detailed, or 3/4 x 3/4 inch size minimum if not detailed; maximum possible lengths.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- G. Foam Block Formwork: For use only where specified on drawings to create void space under or within concrete. ASTM D6817. 1 pound per cubic foot maximum density. 10 pounds per square inch minimum compressive strength at 10% deformation. 3.5 pounds per square inch minimum compressive resistance at 1% deformation. 8 pounds per square inch minimum compressive resistance at 5% deformation. InsulFoam Geofom EPS15, or equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect the substrate and the conditions under which concrete formwork is to be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates and conditions.
- B. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

- A. If natural soil or compacted fill can be accurately cut and maintained, foundations and grade beams may be poured against earth without forming. Provide positive protection of trench top corners.
- B. Maintain earth forms free of water and foreign materials.

3.03 ERECTION – FORMWORK

- A. General: Construct formwork in accordance with calculations, and recommendations of ACI PRC-347. Construct forms to the sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in finished structure. Provide for openings, offsets, sinkages, keyways, recesses, moldings,

rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes.

1. Construct cambers specified in concrete members and slabs in the formwork.
 2. Schedule the work and notify other trades in ample time so that provisions for their work in the formwork can be made without delaying progress of the project. Install all sleeves, pipes, etc. for building services systems, or other work. Secure information about and provide for all openings, offsets, recessed nailing blocks, channel chases, anchors, ties, inserts, etc. in the formwork before concrete placement.
 3. Deflection: Formwork and concrete with excessive deflection after concrete placement will be rejected. Excessive deflection is that which will produce visible and noticeable waves in the finished concrete.
 4. Measure formwork for elevated structural slabs, columns, wall elevations points of maximum camber and submit in writing to the Architect/Engineer prior to placing concrete.
- B. Formwork Construction: Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301. Uniform, substantial and sufficiently tight to prevent leakage of concrete paste, readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Tie, brace, shore, and support to insure stability against pressures from any source, without failure of any component part and without excessive deflection. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.
- C. Provide all openings, offsets, inserts, anchorages, blocking, and other features of the work as shown or required. See INSERTS, EMBEDDED PARTS, AND OPENINGS for detailed requirements.
- D. Warped, checked, or scuffed forms will be rejected.
- E. Maintain membranes, reinforcing and other work free of damage; protect with plywood runway boards or other positive, durable means.
- F. Align joints and make watertight. Keep form joints to a minimum.
- G. Provide fillet and chamfer strips on external corners of exposed locations and as indicated to form patterns in finished work. Extend patterns around corners and into alcoves, on backs of columns and similar locations not otherwise shown.
1. Produce beveled, smooth, solid, unbroken lines, except as otherwise indicated to conform to patterns.
 2. Form corners and chamfers with 3/4 inch x 3/4 inch strips, unless otherwise indicated, accurately formed and surfaced to produce uniformly straight lines and tight edge

joints. Extend terminal edges to required limit and miter chamfer at changes in direction.

- H. Unexposed corners may be formed either square or chamfered.
- I. Ties and Spreaders: Arrange in a pattern acceptable to the Architect when exposed. Snap-ties may be used except at joints between pours where threaded internal disconnecting type shall be used.
- J. Coordinate this section with other sections of work that require attachment of components to formwork.
- K. Reglets and Rebates: Accurately locate, size, and form all reglets and rebates required to receive work of other trades, including flashing, frames, and equipment.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not allow excess form coating material to accumulate in the forms or to come into contact with reinforcement or surfaces which will be bonded to fresh concrete.
- D. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork will be rejected.
- E. Leave no residue or stain on the face of the concrete, nor affect bonding of subsequent finishes or work specified in other sections.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
 - 1. Provide openings in concrete formwork to accommodate work of other sections including those under separate contracts (if any). Size and location of openings, recesses and chases shall be in accordance with the section requiring such items. Accurately place and securely support items to be built into forms.
- B. Construction Joints: Construct and locate generally as indicated on Drawings and only at locations approved by Structural Engineer, so as not to impair the strength of the structure. Form keys in all cold joints shown or required.
- C. Locate and set in place items that will be cast directly into concrete.

- D. Rough Hardware and Miscellaneous Metal: Set inserts, sleeves, bolts, anchors, angles, and other items to be embedded in concrete. Set embedded bolts and sleeves for equipment to template and approved shop drawings prepared by trades supplying equipment.
- E. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- F. Wood Inserts and Nailers: Provide approved preservative-treated lumber. Set all required nailing blocks, grounds, and other inserts as required to produce results shown. Wood plugs shall not be used.
- G. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- H. Piping: Do not embed piping in structural concrete unless locations specifically approved by Structural Engineer.
- I. Conduit: Place conduit below slabs-on-grade and only as specifically detailed on structural drawings. Minimum clear distance between conduits shall be 3 diameters. Location shall be subject to Engineer's written approval and shall not impair the strength of the structure.
- J. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
 - 1. Provide openings for the introduction of vibrators at intervals necessary for proper placement.
 - 2. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- K. Install Form Liner inserts in accordance with manufacturer's recommendations, to produce patterns and textures indicated.
- L. Install waterstops in accordance with manufacturer's recommendations to provide continuous waterproof barrier.

3.06 FORM CLEANING

- A. Clean forms as erection proceeds, remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
 - 1. Remove all dirt, chips, sawdust, rubbish, water and foreign materials detrimental to concrete.
 - 2. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.07 FOOTINGS

- A. Verify elevations and provide final excavation required for footings prior to placing of concrete.

3.08 EQUIPMENT BASES

- A. Form concrete bases for all mechanical and electrical equipment in accordance with approved shop details furnished by other sections.
- B. Sizes and locations as indicated and as required to produce results shown.
- C. Provide coved base for all equipment bases placed on concrete slabs.

3.09 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI SPEC-301.

3.10 FOAM BLOCK FORMWORK

- A. Blocks shall be placed on prepared leveling course for level bearing. Place adjacent blocks in tight contact together. Where placed in multiple layers, orient long axis of upper layer at 90° to lower layer, and so forth for subsequent layers. Anchor blocks as required to prevent movement prior to and during concrete placement. Do not expose to hydrocarbons, solvents, or coal tar.

3.11 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.
- C. Clean and repair surfaces to be re-used in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.
- D. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

3.12 FORM REMOVAL

- A. Do not loosen or remove forms before minimum curing period has elapsed without employment of appropriate alternate curing methods, approved by the Architect in writing.

- B. Remove forms without damage to the concrete using means to ensure complete safety of the structure and without damage to exposed beams, columns, wall edges, chamfers and inserts. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Do not remove forms until the concrete has hardened sufficiently to permit safe removal and the concrete has attained sufficient strength to safely support imposed loads. The minimum elapsed time for removal of forms after concrete has been placed shall be as follows:
 - 1. Columns and Walls: 7 days, provided members are not subjected to overhead loads.
 - 2. Retaining Walls: 21 days minimum.
 - 3. Footings: 7 days minimum. If backfilled immediately, side forms may be removed 24 hours after concrete is placed.
 - 4. Beams, elevated slab, and similar overhead conditions: 28 days unless adequate shoring is provided.
- D. Durations listed above are minimums and are subject to extension at the sole judgment of the Architect/Engineer.
- E. Reshoring: Reshore members where and if required by Formwork Design Engineer.
- F. Do not subject concrete to superimposed loads (structure or construction) until it has attained full specified design strength, nor for a period of at least 14 days after placing.
- G. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

3.13 CLEANING

- A. Remove excess material and debris associated with this work from the job site.

END OF SECTION

SECTION 03 20 00 - CONCRETE REINFORCING**PART 1 GENERAL****1.01 SUMMARY**

A. Section Includes:

1. Reinforcing steel work for all concrete and masonry work as indicated on the drawings and specified herein.
2. Coordinate this work with other work affected by these operations, such as forms, electrical work, mechanical work, structural steel, masonry and concrete.

B. Related Sections:

1. Pertinent Sections of Division 01 specifying Quality Control and Testing Laboratory services.
2. Pertinent Sections of Divisions 03 specifying concrete construction.
3. Pertinent Sections of Divisions 04 specifying masonry construction.
4. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete work.

1.02 REFERENCE STANDARDS

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC) Chapter 19 Concrete.
- B. American Concrete Institute (ACI) SPEC-301 "Specifications for Concrete Construction".
- C. ACI CODE-318 "Building Code Requirements for Structural Concrete and Commentary".
- D. ACI MNL-066 "ACI Detailing Manual".
- E. ASTM International (ASTM) A1064 "Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete".
- F. ASTM A615 "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement".
- G. ASTM A706 "Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement".
- H. American Welding Society (AWS) D1.4 – "Structural Welding Code - Steel Reinforcing Bars".
- I. Concrete Reinforcing Steel Institute (CRSI) - "Manual of Standard Practice".
- J. CRSI - "Placing Reinforcing Bars".

1.03 SUBMITTALS

- A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. Submit for review prior to fabrication.
- B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer.
- C. Shop Drawings: Show complete fabrication and placing details of all reinforcing steel. Comply with requirements of ACI MNL-66. Include:
 - 1. Bar sizes and schedules;
 - 2. Shapes of bent bars, layout and spacing of bars, location of splices.
 - 3. Stirrup spacing, arrangements and assemblies,
 - 4. References to Contract Document detail numbers and designations.
 - 5. Wall elevations corresponding to elevations shown in Contract Documents.
- D. Product Data: Submit manufacturer's product data, specifications, location and installation instructions for proprietary materials and reinforcement accessories. Provide samples of these items upon request.
- E. Certificates: Submit all certifications of physical and chemical properties of steel for each heat number as manufactured, including location of material in structure as specified below in Article titled QUALITY ASSURANCE. All materials supplied shall be tagged with heat numbers matching submitted Mill Test Report analyses.
- F. Samples: Provide to the Owner's Testing laboratory as specified in Article SOURCE QUALITY CONTROL.

1.04 QUALITY ASSURANCE

- A. Perform work of this Section in accordance with the CRSI "Manual of Standard Practice", CRSI "Placing Reinforcing Bars", ACI SPEC-301, and ACI CODE-318.
- B. Requirements of Regulatory Agencies, refer to pertinent Sections of Division 01 and CBC.
- C. Certification and Identification of Materials and Uses: Provide Owner's Testing Agency with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection and all material identification/test information listed below.
 - 1. Provide manufacturer's Mill Test Reports for all materials. Include chemical and physical properties of the material for each heat number manufactured. Tag all fabricated materials with heat number.

2. Provide letter certifying all materials supplied are from heat numbers covered by supplied mill certificates. Include in letter the physical location of each grade of reinforcing and/or heat number in the project (i.e. foundations, walls, etc.).
 3. Unidentified Material Tests: Where identification of materials by heat number to mill tests cannot be made, Owner's Testing Agency shall test unidentified materials as described below.
- D. Testing and Inspection: Tests and Inspections required by Independent Testing Agency are specified below in Articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and test reports in conformance with pertinent Sections of Division 01.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent requirements of Division 01.
- B. Deliver reinforcement to project site in bundles marked with durable tags indicating heat number, mill, bar size and length, proposed location in the structure and other information corresponding with markings shown on placement diagrams.
- C. Handle and store materials above ground to prevent damage, contamination or accumulation of dirt or rust.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Reinforcing Steel: Deformed billet steel bars, ASTM A706 Grade 60 or ASTM A615 Grade 60.
 1. Welded reinforcement shall be ASTM A706, or A615 meeting carbon requirements of AWS D1.4. Welding shall conform with AWS D1.4.
 2. All reinforcement to be unfinished.
 3. ASTM A615 reinforcement at special structural concrete walls, concrete coupling beams, and special concrete moment frames shall have maximum yield stress of 78,000 psi and the tensile strength shall be greater than 125% of the actual yield strength. Test ASTM A615 reinforcement for conformance to these criteria prior to fabrication and/or installation.
- B. Welded Wire Reinforcement: ASTM A1064.
- C. Tie Wire: No. 16 AWG or heavier, black annealed.
- D. Concrete Blocks: On-grade conditions only, as required to support reinforcing bars in position.
- E. Reinforcing Supports: Plastic or galvanized steel chairs, bolsters, bar supports, or spacers sized and shaped for adequate support of reinforcement and construction loads imposed during concrete placement, meeting ACI and CRSI standards.

1. For use over formwork: Galvanized wire bar type supports complying with CRSI recommendations. Provide plastic tips where exposed to view or weather after removal of formwork. Do not use wood, brick, or other unacceptable materials.
- F. Reinforcement Splice Couplers: For use only where specified on drawings. Submit other locations proposed for use to Engineer for review. "L-Series Bar Lock" Coupler Systems for Splicing Reinforcement Bars, UES ER-0319, by Dayton-Superior Corporation.

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4), unless specifically shown otherwise. Details not specifically shown or indicated shall conform to SP-066 and specified codes and standards.
1. Accurately shop-fabricate to shapes, bends, sizes, gauges and lengths indicated or otherwise required.
 2. Bend bars once only. Discard bars improperly bent due to fabricating or other errors and provide new material; do not re-bend or straighten unless specifically indicated. Rebending of reinforcement in the field is not allowed.
 3. Do not bend reinforcement in a manner that will injure or weaken the material or the embedding concrete.
 4. Do not heat reinforcement for bending. Heat-bent materials will be rejected.
- B. Unacceptable materials: Reinforcement with any of the following defects will not be permitted in the work.
1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
 2. Bends or kinks not indicated on Drawings or final shop drawings.
 3. Bars with reduced cross-section due to rusting or other cause.
- C. Tag reinforcement with durable identification to facilitate sorting and placing.
- D. Shop Fusion Welded Stirrup/Tie/Spiral Cages
1. Shop fusion welding of stirrup/tie/spiral cages is permitted to aid in fabrication and handling. The following requirements shall be met.
 2. All reinforcing bars receiving weld shall be ASTM A706.
 3. Longitudinal holding wires shall be ASTM A1064.
 4. Shop welding shall be performed by machines under a continuous, controlled process.
 5. Quality control tests shall be performed on shop-welded specimens and the test results shall be available, upon request, to the Architect/Engineer.

6. Tack welding of reinforcing steel is not permitted.
7. Welding of any type shall not occur at 90°, 135°, or 180° bends. Circular ties and spirals may be shop fusion welded outside of areas with 90°, 135°, or 180° hook bends.
8. Longitudinal bars shall not be welded to stirrups/ties/spirals.

2.03 SOURCE QUALITY CONTROL

- A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform the following:
 1. Material Testing:
 - a. Identified Steel: When samples are taken from bundled steel identified by heat number, matched with accompanying mill analyses as delivered from the mill, supplemental testing of reinforcing steel is not required.
 - b. Unidentified Steel: When identification of materials by heat number matched to accompanying mill analyses cannot be made, perform one tensile test and one bend test per each two and one-half tons or fraction thereof for each required size of reinforcing steel. Tests of unidentified steel shall be performed by the Owner's Testing Agency and costs for these tests shall be paid by the Contractor by deductive change order.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect the conditions under which concrete reinforcement is to be placed. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Coordinate with work of other sections to avoid conflicts or interference. Bring conflicts between reinforcement and other elements to Architect's attention. Resolve conflicts before concrete is placed.
- C. Notify Architect, Structural Engineer, and Authority Having Jurisdiction for review of steel placement not less than 48 hours before placing concrete.

3.02 PLACEMENT

- A. General: Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean bars free of substances which are detrimental to bonding. Maintain reinforcement clean until embedded in concrete.
- C. Place reinforcement to obtain the minimum coverages for concrete protection. Do not deviate from required position. Maintain required distance, spacing and clearance between bars, forms, and ground.

- D. Location and Support: Provide metal chairs, runners, bolsters, spacers and hangers, as required.
- E. Provide additional steel reinforcement as necessary or as directed, to act as spreaders or separators to maintain proper positioning.
- F. Tying and Attachment: Securely tie at all intersections and supports with wire. Prevent dislocation or movement during placement of concrete. Direct twisted ends of wire ties away from exposed concrete surfaces.
- G. Separate reinforcing from pipes or conduits with approved non-metallic separators. Do not use wood or steel form stakes or reinforcement used as stakes as support for reinforcement.
- H. Accommodate placement of formed openings required by other sections.
- I. Obstructions:
 - 1. Where obstructions, block-outs, or penetrations (conduits, raceways, ductwork) prevent continuous placement of reinforcement as indicated, provide additional reinforcing as detailed and as directed by the Structural Engineer to supplement the indicated reinforcement around the obstruction.
 - 2. Place additional trim bars, ties, stirrups, or other elements as detailed and as directed at all opening, sleeves, pipes or other penetrations through structural elements.
- J. Welded Wire Reinforcement: Reinforce slabs with 6"x 6"-W1.4 x W1.4 welded wire reinforcement reinforcing, unless otherwise noted on drawings.
 - 1. Provide flat sheets only, no rolls. Straighten, cut to required size, and lay out flat in place.
 - 2. Securely wire-tie reinforcement to other reinforcement at frequent intervals.
 - 3. Extend reinforcement over supporting beams and walls, and to within 1 inch of edge of slabs, construction joints, and expansion joints.
 - 4. Support reinforcement in mid-depth of slab.
 - 5. Lift reinforcement at intervals as slab concrete is placed, ensure proper embedment.

3.03 REINFORCING SPACING AND COVERAGE

- A. Spacing: Do not space bars closer than four (4) diameters of the largest of two adjacent bars, except at bar laps, which shall be placed such that a minimum of 2 bar diameters is clear between bars.
- B. Where reinforcing in members is placed in two layers, the distance between layers shall not be less than four bar diameters of the largest bar and the bars in the upper layers shall be placed directly above those in the bottom layer, unless otherwise detailed or dimensioned.

- C. Coverage of bars (including stirrups and columns ties) shall be as follows, unless otherwise shown:
1. Footings and Mat Foundation: 3 inches to any soil face, 2 inches to top.
 2. Slabs (on grade): 2 inches to grade face, 1-1/2 inches to top face.
 3. Slabs (elevated): 1-1/2 inches top and bottom.
 4. Beam & Column: 1-1/2 inches to form.
 5. Walls: 1-1/2 inches clear to form and 2 inches clear to form at soil face.

3.04 DOWELS, SPLICES, OFFSETS AND BENDS

- A. Provide standard reinforcement splices at splices, corners, and intersections by lapping ends, placing bars in contact, and tightly tying with wire at each end. Comply with details shown on structural drawings and requirements of ACI CODE-318.
- B. Provide minimum 1-1/2 inch clearance between sets of splices. Stagger splices in horizontal bars so that adjacent splices will be 4 feet apart.
- C. Laps of welded wire reinforcement shall be at least two times the spacing of the members in the direction lapped but not less than twelve inches.
- D. Splices of reinforcement shall not be made at points of maximum stress. Provide splice lengths as noted on the structural drawings, with sufficient lap to transfer the stress between bars by bond and shear.
- E. Spacing:
1. Space bars minimum distance specified and all lapped bars 2 bar diameters (minimum) clear of the next bar.
 2. Stagger splices of adjacent bars where possible and where required to maintain bar clearance.
 3. Beam or slab top bars shall be spliced mid-span of column support and bottom bars spliced at column supports.
 4. Request Architect/Engineer review prior to placement for all splices not shown on the drawings.
- F. Reinforcement Couplers: Install at all locations indicated. Install couplers in accordance with manufacturer's recommendations.

3.05 WELDING

- A. No reinforcing shall be welded unless specifically indicated. No reinforcing shall be welded without prior approval of the Structural Engineer and the Authority Having Jurisdiction.

- B. Only when so approved for use as noted above, all welding shall conform to AWS D1.4, ACI CODE-318, and the following;
 - 1. All welding performed by certified welders.
 - 2. All reinforcement requires preheat prior to welding. All preheat and welding shall be continuously inspected by the Testing Agency.

3.06 MISPLACED REINFORCEMENT

- A. Notify Architect/Engineer immediately if reinforcing bars are known to be misplaced after concrete has been placed.
- B. Perform no correction or cutting without specific direction. Do not bend or kink misplaced bars.
- C. Correct misplaced reinforcing only as directed in writing by the Architect/Engineer. Bear all costs of redesign, new, or additional reinforcing required because of misplaced bars at Contractor's expense.

3.07 FIELD QUALITY CONTROL

- A. The Testing Agency as specified in the Article QUALITY ASSURANCE, will inspect the work for conformance to contract documents before concrete placement.
 - 1. Inspection: Provide inspection and verification of installed reinforcement. Confirm that the surface of the rebar is free of form release oil or other coatings.
 - 2. Inspect all preheat and welding activities for steel reinforcement, when these occur.
 - 3. Exception: Shallow foundations & non-structural slabs-on-grade supporting buildings of no greater than three stories and either of concrete design strength 2500psi (or greater) or supporting light-frame construction do not require special inspection. Non-structural patios, driveways, and sidewalks do not require special inspection.

3.08 CLEANING

- A. Remove excess material and debris associated with this work from the job site.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE**PART 1 GENERAL****1.01 SUMMARY**

- A. Section Includes: Provide all labor, materials, equipment and services to complete all concrete work required, including, but not limited to, the following:
1. Foundations, beams, columns, elevated slabs, slabs-on-ground, walls, and retaining walls.
 2. Installation of all bolts, inserts, sleeves, connections, etc. in the concrete.
 3. Joint devices associated with concrete work.
 4. Miscellaneous concrete elements, including, but not limited to: equipment pads, light pole bases, flagpole bases, thrust blocks, and manholes.
 5. Concrete curing.
 6. Coordination with other sections:
 - a. Make all preparations and do all work necessary to receive or adjoin other work. Install all bolts and anchors, including those furnished by other sections, into formwork and provide all required blocking.
 - b. Install all accessories embedded in the concrete and provide all holes, blockouts and similar provisions necessary for the work of other sections. Provide all patching or cutting made necessary by failure or delay in complying with this requirement at the Contractor's expense.
 - c. Coordinate with other sections for the accurate location of embedded accessories.
- B. Related Sections:
1. Pertinent Sections of Division 01 specifying Quality Control and Testing Laboratory services.
 2. Pertinent Sections of Division 03 specifying concrete construction.
 3. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete.
 4. Pertinent sections of other Divisions specifying floor finishes and sealants applied to concrete substrates.

1.02 REFERENCES

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC) Chapter 19 Concrete.

- B. American Concrete Institute (ACI) PRC-211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete"
- C. ACI PRC-213 "Guide for Structural Lightweight-Aggregate Concrete".
- D. ACI SPEC-301 "Specifications for Concrete Construction".
- E. ACI PRC-302.1 "Guide for Concrete Floor and Slab Construction".
- F. ACI PRC-304 "Guide for Measuring, Mixing, Transporting, and Placing Concrete".
- G. ACI SPEC-305.1 "Specification for Hot Weather Concreting".
- H. ACI SPEC-306.1 "Standard Specification for Cold Weather Concreting".
- I. ACI SPEC-308.1 "Specification for Curing Concrete".
- J. ACI CODE-318 "Building Code Requirements for Structural Concrete and Commentary".

1.03 SUBMITTALS

- A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer. Submittals that do not meet these requirements will be returned for correction without review. Submit for review prior to fabrication.
- B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents.
- C. Product Data: Submit manufacturers' data on manufactured products and other concrete related materials such as bond breakers, cure/sealer, admixtures, etc. Demonstrate compliance with specified characteristics. Provide samples of items upon request.
- D. Mix Designs: Submit Mix Designs for each structural concrete type required for work per requirements of articles CONCRETE MIXES and QUALITY ASSURANCE. Resubmit revised designs for review if original designs are adjusted or changed for any reason. Non-Structural mixes need not be submitted for review by Structural Engineer.
- E. Shop Drawings: Proposed location of construction and cold joints. Proposed location of all slab construction/dowel joints, control joints, and blockouts.
- F. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.
- G. Batch Plant Ticket: Include with delivery of each load of concrete. Provide ticket to the Testing Agency and the Architect/Engineer as separate submittals. Concrete delivered to the site without such ticket shall be rejected and returned to the plant. Each ticket shall include all information specified in Article SOURCE QUALITY CONTROL below.

- H. Engineering Analysis: Prepared by a California-licensed Civil or Structural Engineer, justifying construction-imposed loads on slabs, beams, and walls which exceed those allowed by CBC for the specified use.
 - 1. 2000 lbs maximum allowable construction load without analysis.
 - 2. 10,000 lbs maximum allowable construction load with analysis.
- I. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.
- B. Concrete construction verification and inspection to conform to CBC 1705.3.
- C. Common Sourcing: Provide each of the following materials from consistent sources for entire project.
 - 1. Cement.
 - 2. Fly ash.
 - 3. Aggregate.
 - 4. Slag Cement.
- D. Follow requirements of ACI SPEC-305.1 when concreting during hot weather. Follow requirements of ACI SPEC-306.1 when concreting during cold weather.
- E. Services by the Independent Testing Agency (includes "Special" Inspections) as specified in this Section and as follows:
 - 1. Perform tests and inspections specified below in articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and reports to be in conformance with pertinent Sections of Division 01.
- F. Contractor shall bear the entire cost of remediation, removal, and/or replacement of concrete determined defective or non-conforming, including Architect/Engineer fees for redesign.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Materials specified by brand name shall be delivered in unbroken packages bearing manufacturer's label and shall be brand specified or an approved equal.
- B. Delivery, Handling and Storage of other materials shall conform to the applicable sections of the current editions of the various reference standards listed in this Section.

- C. Protect materials from weather or other damage. Sort to prevent inclusion of foreign materials.
- D. Specific Requirements:
 - 1. Cement: Protect against dampness, contamination, and warehouse set. Store in weather tight enclosures.
 - 2. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregates. Use only one supply source for each aggregate stock pile.
 - 3. Admixtures:
 - a. Store to prevent contamination, evaporation, or damage.
 - b. Protect liquid admixtures from freezing and extreme temperature ranges.
 - c. Agitate emulsions prior to use.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather (Freezing or near-freezing temperatures) per ACI SPEC-306.1:
 - 1. Heat concrete materials before mixing, as necessary to deposit concrete at a temperature of at least 50°F but not more than 90°F.
 - 2. Do not place concrete during freezing, near-freezing weather, snow, rain or sleet unless protection from moisture and/or cold is provided.
 - 3. Protect from freezing and maintain at a temperature of at least 50°F for not less than seven days after placing. Take special precautions to protect transit-mixed concrete.
 - 4. No salts, chemical protection or admixture are permitted without written approval of Architect/Engineer.
 - 5. Contractor shall maintain an air temperature log for the first 7 days after placement with entry intervals not to exceed 8 hours.
- B. Hot Weather per ACI SPEC-305.1:
 - 1. Cool concrete materials before mixing, or add ice in lieu of mix water as necessary to deposit concrete at a temperature below 85°F.
 - 2. Do not place concrete in hot/windy weather without Architect/ Engineer review of procedures.
 - 3. Provide sunshades and/or wind breakers to protect concrete during finishing and immediate curing operations. Do not place slab concrete at air temperature exceeding 90°F.

4. Provide modified mix designs, adding retarders to improve initial set times and applying evaporation reducers during hot/windy weather for review by Independent Testing Agency prior to use.

1.07 MOCK-UP

- A. Construct and erect mock-up panel for architectural concrete surfaces indicated to receive special treatment or finish, as result of formwork.
 1. Panel Size: Sufficient to illustrate full range of treatment.
 2. Number of Panels: 2.
 3. Locate as indicated on drawings.
- B. If requested by Architect / Engineer, cast concrete against mock-up panel. Obtain acceptance of resulting surface finish prior to erecting formwork.
- C. Accepted mock-up panel is considered basis of quality for the finished work. Keep mock-up exposed to view for duration of concrete work.
- D. Mock-up may remain as part of the Work.

1.08 SCHEDULING AND SEQUENCING

- A. Organize the work and employ shop and field crew(s) of sufficient size to minimize inspections by the Testing Agency.
- B. Provide schedule and sequence information to Testing Agency in writing upon request. Update information as work progresses.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Comply with requirements of Section 03 1000.

2.02 REINFORCEMENT

- A. Comply with requirements of Section 03 2000.

2.03 MATERIALS

- A. General Requirements: All materials shall be new and best of their class or kind. All materials found defective, unsuitable, or not as specified, will be condemned and promptly removed from the premises.
- B. Cementitious Materials:
 1. Portland Cement: ASTM C150, Type II, low alkali conforming to CBC 1903.1.
 2. Fly Ash (Pozzolan): ASTM C618, Class F.

3. Slag Cement: ASTM C989, Grade 100 or 120.
- C. Concrete Aggregates:
1. Coarse and Fine Aggregates: ASTM C33; Stone aggregate and sand. Specific source aggregate and/or sand or shrinkage characteristics as required for class of concrete specified.
 2. Lightweight aggregate: ASTM C330 and C332.
 3. Source shall remain constant throughout the duration of the job. The exact portions of the fine aggregates and coarse aggregates to be used in the mix shall be determined by the mix design.
 4. Recycled concrete products: Returned plastic concrete may not be used in a mix. Recycled Concrete Aggregate (RCA) is not permitted. Reclaimed coarse aggregate is permitted and shall comply with ASTM C33. Reclaimed fine aggregate is not permitted.
- D. Water: ASTM C1602. Potable, clean, from domestic source.
- E. Admixtures: All admixtures shall be used in strict accordance with the manufacturer's recommendations. Admixtures containing calcium chlorides or other accelerators shall not be used without the approval of the Architect/Engineer and the Owner's Testing Laboratory.
1. Normal or Mid Range Water Reducing Admixtures: ASTM C494 Type A, "MasterPozzolith" series or "MasterPolyheed" series by Master Builders Solutions, "WRDA" series by W.R. Grace, or equal.
 2. Water Reducing Admixture and Retarder: ASTM C494 Type B or D, "MasterSet R" series or "MasterSet DELVO" series by Master Builders Solutions, "Plastiflow-R" by Nox-crete, or equal.
 3. High Range Water-Reducing Admixtures: ASTM C494 Type F, "MasterRheoBuild 1000" or "MasterGlenium" series by Master Builders Solutions or equal.
 4. Air Entraining Admixtures: ASTM C260, "MasterAir" series by Master Builders Solutions or equal.
 5. Viscosity Modifiers: ASTM C494 Type S, "MasterMatrix VMA" series by Master Builders Solutions or equal..
- F. Slurry: Same proportion of cement to fine aggregates used in the regular concrete mix (i.e. only coarse aggregate omitted); well mixed with water to produce a thick consistency.
- G. High Strength Grout: See section 05 1200 or 05 1100 for requirements.
- H. Dry Pack: Dry pack (used only for cosmetic concrete repairs) shall consist of:
1. One part cement to 2-1/2 parts fine aggregate (screen out all materials retained on No.4 sieve), mixed with a minimum amount of water, added in small amounts.

2. Mix to consistency such that a ball of the mixture compressed in the hand will retain its shape, showing finger marks, but without showing any surface water.

2.04 ACCESSORIES

- A. Bonding Agent: ASTM C881, Type II Grade 2 Class B or C. Do not allow epoxy to set before placing fresh concrete.
 1. "MasterEmaco ADH 326" by Master Builders Solutions;
 2. "Rezi-Weld 1000" by W.R. Meadows.
- B. Chemical Hardener: Fluorosilicate solution designed for densification of cured concrete slabs. "MasterKure HD 300 WB" by Master Builders Solutions, "LIQUI-HARD" W.R. Meadows Co, or equal.
- C. Moisture-Retaining Cover: ASTM C171, type 1, one of the following;
 1. Regular Curing Paper, Type I, reinforced waterproof: Fortifiber Corporation "Orange Label Sisalkraft", "Pabcotite" paper, or equal.
 2. Polyethylene Film: ASTM D 2103, 4 mil thick, clear or white color.
 3. White-burlap-polyethylene sheet, weighing not less than 10 oz/per linear yd.
- D. Liquid Curing Compound: ASTM C 309, Type 1, Class B, clear or translucent, 25% minimum solids, water base acrylic cure/sealer which will not discolor concrete and compatible with bonding of finishes specified in related sections. W.R. Meadows Co. "Vocomp 25" or equal. Maximum VOC content shall comply with local requirements and California Green Building Code.
- E. Under Slab Water Vapor Retarder: Vapor retarder sheet to be ASTM E1745 Class A; 15 mil, single ply extruded polyolefin; permeance no greater than 0.01 U.S. Perms per ASTM E154, ASTM E96 procedure B or ASTM F1249.
 1. "Stego Wrap Vapor Barrier (15mil)" by Stego Industries LLC.
 2. "Vaporguard" by Reef Industries.
 3. Approved Equal.
- F. Evaporation Reducer: "MasterKure ER 50", by Master Builders Solutions.
- G. Permeability Reducer: Use only where specifically referred to.
 1. ASTMC494 Type S.
 2. Admixture Type: Xypex Chemical Corporation "XYPEX Admix C-500", Master Builders Solutions "MasterLife 300" series. Dosage: per manufacturer.
 3. Surface-Applied Type: Xypex Chemical Corporation "XYPEX Concentrate. Brush application: 1.25-1.50lb/sq. yd., 5 parts powder to 2 parts water. Master Builders

Solutions "MasterSeal 500". Slurry coat: one part water to 2.25-2.5 parts powder by volume.

4. Approved equal.

2.05 JOINT DEVICES AND MATERIALS

- A. Waterstops: Resilient type, meeting Corps of Engineers CRD-C 572. Consult manufacturer for appropriate product for specific use. Submit for review. Install per manufacturers recommendation. Provide W. R. Meadows "Seal Tight" PVC waterstop, Sika "Greenstreak" PVC waterstop, or approved equal.
- B. Expansion Joint Filler: ASTM D1751, Nonextruding, resilient asphalt impregnated fiberboard or felt, 3/8 inch thick and 4 inches deep; tongue and groove profile.
 1. Products: "Serviced Products", W.R. Meadows, Inc., "National Expansion Joint Company", "Celotex Corporation", or equal.
- C. Joint Filler: ASTM D944, Compressible asphalt mastic with felt facers, 1/4 inch thick and 4 inches deep.
- D. Sealant and Primer: As specified in Section 07 9000.
- E. Slab Joint Sealant: Compatible with floor finishes specified in related sections.

2.06 CONCRETE MIXES

- A. General requirements for mix design and submittal of structural class concrete:
 1. Provide Contractor submittals to Architect/Engineer not less than 15 days before placing concrete.
 2. Contractor shall review mix designs and proposed placing requirements prior to submittal for compatibility to ensure that the concrete as designed can be placed in accordance with the drawings and specifications.
 3. Changes or revisions require re-submittal: All variations to approved mix designs, including changing type and/or quantity of admixtures shall be resubmitted to the Architect/Engineer for review prior to use.
 4. Mix design(s) for all structural classes of concrete to be prepared by qualified person experienced in mix design. Allow for time necessary to do trial batch testing when required.
 5. Preparer to provide backup data and certify in writing that mix design meets:
 - a. Requirements of the specifications for concrete durability and quality;
 - b. Requirements of the California Building Code and ACI CODE-318, including break histories, trial batching test results, and/or a mix designed by a California Registered Civil Engineer per ACI CODE-318 and bearing the Engineer's seal & signature.

6. Clearly note on mix designs with specified maximum W/CM if design permits addition of water on site, or clearly identify in the mix design that no water is to be added on site.
 7. Deviations: Clearly indicate proposed deviations, and provide written explanation explaining how the deviating mix design(s) will provide equivalent or better concrete product(s) than those specified.
 8. Include adjustments to reviewed mix designs to account for weather conditions and similar factors.
- B. Proportioning - General: The following provisions apply to all mix designs:
1. Proportion concrete mixes to produce concrete of required average strength (as defined by ACI CODE-318). Select slump, aggregate sizes, shrinkage, and consistency that will allow thorough compaction without excessive puddling, spading, or vibration, and without permitting the materials to segregate, or allow free water to collect on the surface.
 2. Select aggregate size and type to produce dense, uniform concrete with low to moderate shrinkage, free from rock pockets, honeycomb and other irregularities.
 3. Mix designs may include water reducing and retarding admixtures to meet or exceed minimum set times (time required to place and finish) and to minimize Water-Cementitious Materials (W/CM). Minimum and maximum criteria presented in this section are guidelines and do not represent a specific mix design.
 4. Cement Content: Minimum cement content indicates minimum sacks of cementitious material. Increasing cement content to increase early strengths or to achieve specified W/CM while maintaining water content is discouraged in order to minimize effects of shrinkage.
 - a. Substitution of fly ash for Portland cement on an equivalent weight basis up to 25% replacement is permitted, except at high early strength concrete. Replacement in excess of 25% is not permitted unless part of a specified mix design that has been submitted for review.
 - b. Substitution of slag cement for Portland cement on an equivalent weight basis up to 45% replacement is permitted, except at high early strength concrete. Replacement in excess of 45% is not permitted unless part of a specified mix design that has been submitted for review.
 - c. Such substitution requests may be denied by the Engineer.
 5. Water Content: Mix designs with a specified maximum W/CM may be designed with a lower WCR than specified in order to allow addition of water at the site.
 6. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301 and this section.

- a. For trial mixtures method, employ independent testing agency acceptable to Architect/Engineer for preparing and reporting proposed mix designs.
7. Placement Options: Mix designs may, at the Contractor's option, be designed for either pump or conventional placement with aggregate size, slumps, etc. to be maintained as specified in this section.
- C. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations and this section.
- D. Proportioning Structural Light Weight Concrete: Comply with ACI PRC-213 recommendations and this section. Maximum cured weight of light weight concrete shall be 120 pounds per cubic feet. General Contractor is responsible for coordinating and providing light weight concrete density to meet the required fire assembly rating of the Construction Documents at the concrete depths provided in the structural drawings. General Contractor to notify the Structural Engineer for review if light weight concrete of the required density for the specified fire assembly rating cannot be sourced.
- E. Special mix design requirements for interior concrete floor slabs-on-ground:
1. Proportion concrete mixes per this specification, ACI PRC-211.1, and the requirements below:
 2. Fly Ash, shall be substituted for cement on a 1 lb. per 1 lb. basis, with a minimum replacement of 25% and a maximum of 35%. Alternatively, slag cement, shall be substituted for cement on a 1 lb. per 1 lb. basis, with a minimum replacement of 30% and a maximum of 45%.
 3. 200 lbs. of 3/8(-) aggregate shall be added to reduce total sand.
 4. Reduce total sand to minimum practical.
 5. Admixture dosage shall be per manufacturer's recommendations. Dosage may be increased for workability as long as set times are not excessive for placement and finishing.
- F. Special mix design requirements for high volume fly ash concrete:
1. Proportion concrete mixes per this specification, ACI PRC-211.1, and the requirements below:
 2. Fly Ash shall be substituted for cement on a 1 lb. per 1 lb. basis, with a replacement of 50%.
 3. Minimum strength at 28 days to be 2500 psi; minimum strength at 56 days to be 3000 psi.
 4. Add 200-300 pounds 3/8" aggregate to replace portion of fine aggregate.

- 5. Admixture dosage shall be per manufacturer’s recommendations. Dosage may be increased for workability as long as set times are not excessive for placement and finishing.

G. Concrete shall be wet cured per CONCRETE CURING.Mix Design Minimum Requirements:

Concrete Class	Coarse Aggregate Size (Inches) & Fine Aggregate ³	Maximum W/CM or Maximum Nominal Slump & Tolerance (Inches) ^{1,2}	Minimum 28-Day Design Strength	Minimum Cement Sacks/per yd ⁴
NON-STRUCTURAL				
1) Lean Concrete (use only where specified)	---	---	---	3.0
2) Slab on Ground Exterior (Walks & Patios)	1" x #4	W/CM = .55	2,500	4.5
STRUCTURAL				
3) Interior Slab on Ground ⁵	1" x #4	W/CM = .45	3,000	6.1
4) Foundation (including stem walls)	1" x #4	W/CM = .53	3,000	5.0

- 1. The tolerance is the maximum deviation allowable without rejection. The mix design shall be based on the nominal value specified and is without water reducing mixtures. Slump to be measured at the end of the hose.
- 2. The maximum W/CM is limited at time of placement as noted. No water is to be added on site such that the specified W/CM or maximum slump is exceeded without approval of the testing laboratory and the Architect/Engineer. Workability is to be achieved utilizing an acceptable mid range to high range water reducing admixture.
- 3. Gradation of aggregate is per ACI CODE-318 and ASTM C33.
- 4. Minimum cement content includes all cementitious materials.
- 5. See Article 2.6E for additional requirements at interior slabs on ground.
- 6. See article 2.6F for additional requirements at high volume fly ash concrete.

2.07 MIXING CONCRETE

- A. Batch final proportions in accordance with approved mix designs. All adjustments to approved proportions, for whatever reason, shall be reviewed by the Architect/Engineer prior to use.
- B. Batch and mix concrete in accordance with ASTM C94, at an established plant. Site mixed concrete will be rejected.
- C. Provide batch and transit equipment adequate for the work. Operate as necessary to provide concrete complying with specified requirements.

- D. Place mixed concrete in forms within 1-1/2 hours from the time of introduction of cement and water into mixer or 300 revolutions of the drum whichever comes first. Use of, re-mixing, and/or tempering mixed concrete older than 1 hour will not be permitted.
- E. Do not add water at the site to concrete mixes with a maximum specified W/CM unless the water content at batch time provides for a W/CM less than specified and this provision, including the quantity of water which may be added at the site, is specifically noted on the mix design and certification by the mix preparer. See ASTM C94 for additional requirements.

2.08 SOURCE QUALITY CONTROL

- A. Services by independent Testing Agency:
 - 1. Batch Plant Certificates: Obtain the weighmaster's Batch Plant Certificate at arrival of truck at the site. If no batch plant certificate is provided, recommend to the General Contractor that the truckload of concrete be rejected. So note in daily log, along with the location of the load of concrete in the structure if the load is not rejected.
 - a. Laboratory's inspector shall obtain for each transit mixer Batch Plant Certificates to verify mix design quantities and condition upon delivery to the site.
 - b. Certificates to include: Date, time, ingredient quantities, water added at plant and on job, total mixer revolutions at time of placement, and time of departure.
 - c. Concrete with specified water cement ratio: Add no water on site unless mix design and batch records each show additional water may be added. See ASTM C94 for additional requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.
- B. Verify work of other sections is complete and tested as required before proceeding.

3.02 PREPARATION

- A. Observation, Inspection and Testing:
 - 1. Architect/Engineer: Notify not less than 2 working days before each concrete placement, for observation and review of reinforcing, forms, and other work prior to placement of concrete.
 - 2. Testing Agency: Notify not less than 24 hours before each placement for inspection and testing.
- B. Placement Records: Contractor shall maintain records of time, temperature and date of concrete placement including mix design and location in the structure. Retain records until completion of the contract. Make available for review by Testing Agency and Architect/Engineer.

- C. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.
- D. Verify location, position and inclusion of all embedded and concealed items.
- E. Verify installation of vapor retarder under interior slabs on ground, as specified in related section, is complete.
- F. Cleaning and Preparation:
 - 1. Remove loose dirt, mud, standing water, and foreign matter from excavations and cavities.
 - 2. Close cleanout and inspection ports securely.
 - 3. Thoroughly clean reinforcement and other embedded items free from loose rust and foreign matter. Maintain reinforcing securely in place. Do not place concrete on hot reinforcing.
 - 4. At cold joints, remove laitance from previously placed concrete surface.
 - 5. Dampen form materials and substrates on which concrete is to be placed at least 1 hour in advance of placing concrete; repeat wetting as necessary to keep surfaces damp. Do not saturate. Do not place concrete on saturated material.
 - a. Thoroughly wet wood forms (except coated plywood), bottom and sides of trenches, adjacent concrete or masonry and reinforcement.
 - b. Concrete slabs on base rock, dampen rock.
 - c. Concrete slabs on vapor retarder, do not wet vapor retarder.
 - 6. Verify that metal forms are clean and free of rust before applying release agent.
 - 7. Thoroughly clean metal decking. Do not place concrete on wet deck surface.
 - 8. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- G. Drill holes in existing concrete at locations where new concrete is doweled to existing work. Insert steel dowels and prepare connections as detailed.
- H. Do not overcut at existing concrete work to remain. Contractor is responsible for repair/replacement of overcut concrete to the Owner's satisfaction.

3.03 PIPES AND CONDUITS IN CONCRETE

- A. Slabs-on-Ground:
 - 1. No pipe or conduit exceeding 1 inch outside diameter shall be embedded within the specified slab thickness except as specifically detailed.
 - 2. Do not stack or abut pipes, maintain 3 inches minimum clearance.

- B. Sleeving and Wrapping:
1. Foundations: Sleeve or wrap all individual pipe penetrations, minimum 1-1/2 inches clear to reinforcing all around.
 - a. Sleeves: PVC. Provide 1 inch minimum clear all around O.D. pipe to I.D sleeve, UNO at ends, fill void space with mastic or plastic bituminous cement.
 - b. Wrapped Vertical Pipes: Provide 1/8 inch nominal sheet foam with three wraps minimum, UNO.
 - c. Wrapped Horizontal Pipes: Provide 1/8 inch nominal sheet foam with eight wraps minimum, UNO.
 - d. Underground Fire Lines 4" and Larger: At sleeves provide 2 inch minimum clear all around O.D. pipe to I.D sleeve. At wrapped pipes, provide 1/8 inch nominal sheet foam with sixteen wraps minimum.
 2. Slabs or Curbs: Wrap pipes as described above.
- C. Space groups of pipes/conduits at least 3 sleeve diameters apart, do not interrupt specified concrete and reinforcement.
1. Provide block-outs as detailed when grouping of pipes/conduits in foundation or other structural member prevents spacing as described. Notify Architect/Engineer for review of any conditions not conforming to details.
 2. Center pipe/conduit penetrations in the depth and/or thickness of foundations.
 3. Maximum size of pipe/conduit penetrations shall not exceed the least dimension of concrete divided by 3.
- D. Do not embed pipes/conduits in concrete slabs on metal deck.
- E. Provide the following at pipes/conduits detailed to be embedded in a concrete beam, wall or column:
1. Place as near as possible to center of member with reinforcing as specified on each side.
 2. Where reinforcing is located near or at center of member, place pipe or conduit 1 inch minimum clear from reinforcing and provide #3 at 12 inches on center perpendicular to the pipe/conduit. Reinforcing to extend 12 inches minimum past pipe/conduit each side.
 3. Maintain 3/4 inch clear minimum from added reinforcing to face of concrete where not exposed to weather and 1-1/2 inches clear where exposed to weather.
 4. Space embedded items (groups of pipe/conduit, junction boxes or other elements) minimum 3 inches apart.

5. Provide reinforcing in walls, beams, columns as detailed for groups of pipe/conduit. Provide minimum replacement reinforcement of same size and number for interrupted or displaced reinforcement for the full height, length, width of the wall, beam, and/or column on each side of the "effective opening."

3.04 CONCRETE PLACEMENT

- A. Transporting:
 1. Provide clean, well-maintained equipment of sufficient quantity and capacity to execute the work and produce concrete of quality specified.
 2. Handle and transport concrete from mixer to final deposit location as rapidly as practicable. Prevent separation or loss of ingredients.
- B. Perform concrete placement by methods which will not puncture, damage or disturb vapor retarder membrane. Repair all damage to vapor retarder membrane before covering.
- C. Placement - General: Placement, once started, shall be carried on as a continuous operation until section of approved size and shape is completed. Provide construction joints as detailed on the drawings. Engineer's written approval required for all deviations.
 1. Deposition:
 - a. Deposit concrete to maintain an approximately horizontal plastic surface until the completion of the unit placement.
 - b. Deposit as neatly as practicable in final position, minimize re-handling or flow.
 - c. Do not drop concrete freely where reinforcing bars, embeds, or obstructions occur that may cause segregation. Provide spouts, elephant trunks, or other means to prevent segregation during placement.
 2. Depth: Layered placement in columns and walls shall not exceed ten feet vertical depth.
 - a. Place concrete in minimum 32 inch horizontal lifts.
 - b. Schedule placement to ensure that concrete will not take initial set before placement of next lift.
 - c. No horizontal cold joints are allowed in columns or walls.
 3. Progress Cleaning: Remove all concrete spilled on forms or reinforcing steel in portions of structure not immediately concreted. Remove completely before concrete sets.
 4. Interruptions: Shut down placement operations and dispose of all remaining mixed concrete and concrete in hoppers or mixers following all interruption in placement longer than 60 minutes.

- a. If such interruption occurs, provide new or relocate existing construction joints as directed by Engineer.
 - b. Cut concrete back to the designated line, cleaning forms and reinforcing as herein specified.
 - c. Prepare for resumption of placement as for new unit when reason for interruption is resolved.
- D. Placement - Elevated Structural Systems: Place as noted for "General" above and as follows:
1. Metal Decking and Structural Steel Beam Systems that are not to be shored: Locate screed lines on primary structural members. Review proposed screed line locations and expected structural deflections with the Architect/Engineer prior to placement of concrete.
 2. Place screed lines to match camber of primary girders made of material other than concrete. Locate screeds to provide the minimum specified thickness of concrete at all locations.
 3. Compensate for deflection of intermediate structural members and decking by placement of additional concrete.
 4. Adjust embedded items to compensate for camber and deflection. Maintain locations within specified tolerances.
- E. Consolidation:
1. Consolidate all concrete thoroughly during placement with high-speed mechanical vibrators and other suitable tools. Perform manual spading and tamping to work around reinforcement, embedded fixtures, and into corners of formwork as required to obtain thorough compaction.
 - a. Provide vibrators with sufficient amplitude for adequate consolidation.
 - b. Use mechanical vibrators at each point of concrete placement.
 - c. Keep additional spare vibrators, in addition to those required for use, at the site for standby service in case of equipment failure.
 2. Consolidate each layer of concrete as placed.
 - a. Insert vibrators vertically at points 18 to 30 inches apart; work into top area of previously placed layer to reconsolidate, slowly withdraw vibrator to surface.
 - b. Avoid contact of vibrator heads with formwork surfaces.
 - c. Systematically double back and reconsolidate wherever possible. Consolidate as required to provide concrete of maximum density with minimized honeycomb.

F. Unacceptable Materials:

1. Do not place concrete that has started to set or stiffen. Dispose of these materials.
2. Do not add water on site to concrete except as specified in the approved mix design, see PART 2 above.

G. Protection of installed work:

1. Do not introduce any foreign material into any specified drainage, piping or duct systems.
2. Contractor shall bear all costs of work required to repair or clean affected work as a result of failure to comply with this requirement.

3.05 CONCRETE JOINTS

A. Structural Joints (Construction/Cold Joints):

1. Locate joints only where shown, or as approved.
2. Review Required: Joints not indicated on the plans shall be located to meet the minimum requirements below, shall not impair the strength of the structure and shall be submitted to Architect/Engineer for review prior to placement of concrete.
 - a. Indicate proposed location(s) of construction/cold/expansion joints on shop drawing submittals for review prior to placing concrete.
3. Clean and roughen all surfaces of previously placed concrete at construction joints by washing and sandblasting to expose aggregate to 1/4 inch amplitude.
4. Slabs-On-Ground: Maximum Length of continuous placement shall not exceed 60 feet without special review by the Architect/Engineer. Alternate or stagger placement sections.
5. Foundations, Beams, Elevated Slabs and Joists: Maximum Length of continuous placement shall not exceed 200 foot increments. Provide "keyed" shut-off locations made up with form boards. Extend reinforcing one lap length or more through shut-off.
 - a. All reinforcement shall be continuous through construction/cold joint, lapping to adjacent reinforcing in future placement.
 - b. Construction Joints in Elevated Slabs: Review all proposed locations with Architect/Engineer.
 - c. Construction Joints in Slabs on Metal Decking: Review all proposed locations with Architect/Engineer. Do not locate closer than 48 inches of centerline of beam.
6. Retaining and Basement Walls: Maximum Length of continuous placement shall not exceed 100 foot increments. Provide "keyed" shut-off locations made up with form boards to limit the length of continuous placement and at abrupt changes in wall thickness. Extend reinforcing one lap length or more through shut-off.

- a. Review all proposed locations with Architect/Engineer
 - b. Horizontal construction joints are not allowed unless approved by the Engineer
7. Horizontal Construction Joints: Place 2 inch slurry (specified concrete mix less coarse aggregate) at beginning of pour at the bottom of walls unless a prior review of a mock-up section demonstrates that segregation of aggregate will not occur.
- B. Expansion/Construction Joints (Dowel Joints and Control Joints):
1. Interior and Exterior Slabs-on-Ground:
 - a. Expansion/Construction Joints: Provide dowel joints or control joints at a maximum dimension (in feet) of three times the slab thickness (in inches) in each direction unless noted otherwise (15'-0" maximum). Install joints to match slab level and in straight lines. Locate joints at all reentrant corners including blockouts.
 - b. Proportions: Install joints to divide slab into rectangular areas with long dimensions less than 1.5 times short dimension.
 2. Exterior Concrete Slabs-on-Ground (walkways, patios):
 - a. Expansion/ construction joints: Provide a 2 inch deep troweled groove or asphalt impregnated joint material embedded 50 percent of the slab depth at 12 feet on center, maximum.
 - b. Proportions: Place no section with a length larger than two times width. Additionally, place joints at all inside corners and at all intersections with other work.
 3. Elevated Structural Slabs: Locate construction joints as specifically indicated on the drawings. All additional proposed locations shall be reviewed by the Architect/Engineer prior to placement.
 4. Retaining and Basement Walls:
 - a. Contraction Joints: Provide ¾ inch wide beveled wood strips attached to inside face of formwork on each side of the wall. Wood strips shall extend 1/8 times the wall thickness into the wall. Cut 50% of the horizontal reinforcing bars at contraction joint locations
 - b. Proportions: Place joints at 2 times the height of the wall on center max, but not less than 10'-0". Joints shall not exceed 25'-0" on center.
 - c. Review all proposed locations with Architect/Engineer
- C. Joint Types:
1. Dowel Joint: A keyed joint with smooth dowels passing through to allow unrestricted movement due to contraction and expansion. Joints are as specified on the drawings.

2. Control Joint(s): Shrinkage crack control joints may be of the following types when shown on the drawings. Install joints in a straight line between end points with edges finished appropriate to type. Depth shall be 25% of the slab thickness, unless noted otherwise. Fill joints with sealant as shown on the drawings or as required by related sections.
 - a. 1/4 inch wide troweled joint.
 - b. Keyed joint: Only at locations where concealed by other finishes.
 - c. Masonite Strip, 1/8 inch: Only at locations where concealed by other finishes.
 - d. Saw Cut, 1/8 inch: Must be performed within eight hours of completion of finishing. Do not make saw cuts if aggregate separates from cement paste during cutting operation. Prevent marring of surface finish. Fill with flexible sealant.

3.06 VAPOR RETARDER

- A. Vapor Retarder Installation: Install as specified in PART 2, ASTM E1643, and per manufacturer's recommendations including taping and lapping of seams, sealing of penetrations, and repair of damage. Do not extend vapor retarder below footings.

3.07 FLATWORK

- A. General Requirements for All Concrete Formed & Finished Flat:
 1. Edge Forms and Screeds: Set accurately to produce indicated design elevations and contours in the finished surface, edge forms sufficiently strong to support screed type proposed.
 2. Jointing: Located and detailed as indicated.
 3. Consolidation: Concrete in slabs shall be thoroughly consolidated.
- B. Flatwork Schedule:
 1. Exterior Slabs-On- Ground: Place concrete directly over sub-base as indicated.
 - a. Sub-Base: Clean free-draining, crushed base rock, 4 inch minimum thickness, thoroughly compacted.
 2. Interior Concrete Slabs-On- Ground:
 - a. Sub-Base: Clean free-draining, crushed base rock, 4 inch minimum thickness, thoroughly compacted.
 - b. Vapor Retarder: Install over sub-base.

3.08 FORMED SURFACES

- A. Form all concrete members level and plumb, except as specifically indicated. Comply with tolerances specified in ACI CODE-318, ACI SPEC-301, and this specification, except that maximum permissible deviation is 1/4 inch end-to-end for any single member.
- B. Cambers: Provide all cambers indicated in the formwork construction. Set screeds to produce specified cambers in the finished concrete.

3.09 CONCRETE FINISHES

- A. Flatwork Finishing:
 - 1. Perform with experienced operators.
 - 2. Finish surfaces monolithically. Establish uniform slopes or level grades as indicated. Maintain full design thickness.
 - 3. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains as indicated on drawings.
 - 4. Flatwork Finish Types:
 - a. Wood Float Finish: Surfaces to receive quarry tile, ceramic tile, or cementitious terrazzo with full bed setting system, or wood frame for raised finished floors.
 - b. Steel Trowel Finish: Surfaces to receive carpeting, resilient flooring, seamless flooring, thin set terrazzo, thin set tile or similar finishes specified in related sections. Trowel twice, minimum.
 - c. Broom Texture Finish: Exterior surfaces as indicated or for which no other finish is indicated. Finish as for steel trowel finish, except immediately following first troweling, (depending on conditions of concrete and nature of finish required) provide uniform surfaces texture using a medium or coarse fiber broom.
- B. Other Concrete: Provide as required to achieve appearance indicated on structural and architectural drawings and related sections.
 - 1. Repair surface defects, including tie holes, immediately after removing formwork.
 - 2. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
 - 3. Exposed Form Finish: Finish concrete to match forms. Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 - a. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
 - b. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.

- c. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.
- 4. Intermediate joint and score marks and edges: Tool smooth and flush unless otherwise indicated or as directed by the Architect.
- 5. Use steel tools of standard patterns and as required to achieve details shown or specified. All exposed corners not specified to be chamfered shall have radiused edges.

3.10 TOLERANCES

- A. Minimum Flatwork Tolerances: Measure flatness of slabs within 48 hours after slab installation in accordance with ACI PRC-302.1 and ASTM E1155 and to achieve the following FF and FL tolerances:
 - 1. Exterior surfaces: 1/8 inch minimum per foot where sloped to drain. Level otherwise. FF20 and FL15.
 - 2. Interior surfaces not otherwise shown or required: Level throughout. FF25 and FL20
 - 3. Interior surfaces required to be sloped for drainage: 1/8 inch in 10 ft.
 - 4. Finish concrete to achieve the following tolerances:
 - a. Under Glazed Tile on Setting Bed: FF30 and FL20.
 - b. Under Resilient Finishes: FF35 and FL25.
 - c. Flooring manufacturer and pertinent section of Division 9.
- B. Formed Surface Tolerances:
 - 1. Permanently Exposed Joints and Surfaces: Provide maximum differential height within two feet of, and across construction joints of 1/16 inch.
 - 2. Vertical Elevations: Elevation of surfaces shall be as shown or approved.

3.11 SEPARATE FLOOR TOPPINGS

- A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.
- B. Place required dividers, edge strips, reinforcing, and other items to be cast in.
- C. Apply bonding agent to substrate in accordance with manufacturer's instructions.
- D. Apply sand and cement slurry coat on base course, immediately prior to placing toppings.
- E. Place concrete floor toppings to required lines and levels. Place topping in checkerboard panels not to exceed 20 feet in either direction.

- F. Screed toppings level, maintaining surface tolerances per above.

3.12 CONCRETE CURING

- A. Curing - General: Cure in accordance with ACI SPEC-308.1. Maintain concrete water content for proper hydration and minimize temperature variations. Begin curing immediately following finishing.
- B. Protection During Curing: Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. The General Contractor is responsible for the protection of the finished slab from damage.
1. Avoid foot traffic on concrete for minimum of 24-hours after placement.
 2. Protect concrete from sun and rain.
 3. Maintain concrete temperature at or above 50 degrees F. during the first 7 days after placement. See Article ENVIRONMENTAL REQUIREMENTS.
 4. Do not subject concrete to design loads until concrete is completely cured, and until concrete has attained its full specified 28-day compressive strength or until 21 days after placement, whichever is longer.
 5. Protect concrete during and after curing from damage during subsequent building construction operations. See Article PROTECTION.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
1. Normal concrete: Not less than 7 days.
 2. High early strength concrete: Not less than 4 days.
- D. Begin curing immediately following finishing.
- E. Surfaces Not in Contact with Forms:
1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than 3 days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 2. Begin final curing after initial curing but before surface is dry.
 - a. Moisture-retaining cover: Seal in place with waterproof tape or adhesive.
 - b. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.
 3. In addition, see specific conditions noted below.

- F. Slabs on Ground: Cure by one of the following methods:
1. Water Cure (Ponding): Maintain 100 percent coverage of water over floor slab areas, continuously for minimum 7 calendar days.
 2. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
 3. Moisture-Retaining Film or Paper: Lap strips not less than 6 inches and seal with waterproof tape or adhesive; extend beyond slab or paving perimeters minimum 6 inches and secure at edges; maintain in place for minimum 7 days.
 4. Absorptive Moisture-Retaining Covering: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides and extend beyond slab or paving perimeters 6 inches minimum; maintain in place for minimum 7 days.
 5. Liquid Membrane-forming Curing Compound: Provide only when subsequent concrete treatments or finish flooring specified in related sections will not be affected by cure/sealer. Apply curing compound in accordance with manufacturer's instructions at the maximum recommended application rate in two coats, with second coat applied at right angles to first.
- G. Elevated Slabs: Cure by one of the following methods.
1. Moisture-Retaining Sheet: As specified for Slab on Ground above.
 2. Water Cure: As specified above for minimum 14 days.
 3. Apply Membrane Curing Compound as specified above after initial curing period.
- H. Concrete on Metal Decking: Moisture-Retaining Sheet method as specified above.
- I. Formed Concrete Members: Cure by moist curing with forms in place for full curing period.
1. Protect free-standing elements from temperature extremes.
 2. Maintain forms tight for minimum 7 days. Maintain exposed surfaces continuously damp and completely covered by sheet materials thereafter.
 3. Maintain all shoring in place. Refer to related sections specifying formwork.
 4. Membrane Curing Compound: Apply compound in accordance with manufacturer's instructions in one coat.
- J. Foundations: Apply curing compound immediately after floating.

3.13 CONCRETE HARDENER

- A. Apply hardener to all floor slabs not receiving other finishes after 30 days minimum curing. Clean slabs of non-compatible cure/sealers or other foreign material(s) and apply in strict accordance with the manufacturer's directions.

3.14 GROUTING AND DRY PACK

- A. Set steel plates on concrete or masonry with high strength grout bed, completely fill all voids; thoroughly compact in place. See Section 05 1200 or 05 1100.
- B. Bolts or inserts dry packed or grouted in place shall cure for minimum 7 days before tensioning.

3.15 FIELD QUALITY CONTROL

- A. Testing and Inspections by Independent Testing Agency: Provided verification and inspection of concrete per CBC Table 1705.3. Provide written reports for to Engineer, Architect, Contractor and Building Official for the following tests and inspections:
- B. Testing & Inspection: Provide periodic inspection of reinforcing steel. Provide continuous inspection during placement of structural class concrete, 3000 psi or more. Non-structural class concrete with a design strength of 2500 psi or less to have periodic inspection on a 150 cubic yard basis as required to assure conformance.
 - 1. Provide periodic inspection of bolts in concrete prior to and during placement where so noted on the construction documents.
 - 2. Structural Concrete Cylinder Tests: Form in accordance with ASTM C31.
 - a. Take four standard 6 inch x 12 inch (or five 4 inch x 8 inch) cylinder specimens on the site, of each class of concrete as specified in PART 2, not less than once a day or for each 150 cubic yards or 5000 sq ft or fraction thereof placed each day.
 - b. Record the location of each concrete batch in the building in a log and also note on each specimen.
 - c. Perform standard compression test of cylinders in accordance with ASTM C39, one at 7 days and two (three for 4x8 cylinders) at 28 days.
 - d. Hold fourth (fifth) cylinder untested until specified concrete strengths are attained.
 - 3. Structural Concrete Slump Test and Air Tests: Perform slump in accordance with ASTM C143 and air content in accordance with C231 or C173 at the time of taking test cylinders, and/or at one-hour intervals during concrete placing.
 - 4. Measure and record concrete temperature in accordance with ASTM C1064 upon arrival of transit mixers and when taking specimens. Note weather conditions and temperature.
 - 5. Determine concrete density in accordance with ASTM C138 at the time of forming test cylinders.
 - 6. Propose adjustments to reviewed mix designs for Architect / Engineer review to account for variations in site or weather conditions, or other factors as appropriate.

7. Water Vapor Transmission Tests: Floors receiving floor finishes specified in related sections will be tested prior to installation of flooring systems. Refer to sections specifying floor finishes for related requirements.

C. Services by Contractor:

1. Rejection of Concrete Materials: Do not use the following without prior written approval of the Architect/Engineer;
 - a. Materials without batch plant certificates.
 - b. Materials not conforming to the requirements of these specifications.

3.16 ADJUSTING

- A. Inspect all concrete surfaces immediately upon formwork removal. Notify Architect/Engineer of identified minor defects. Repair all minor defects as directed.
- B. Surface and Finish Defects: Repair as directed by the Architect/Engineer, at no added expense to the Owner. Repairs include all necessary materials; reinforcement grouts, dry pack, admixtures, epoxy and aggregates to perform required repair.
 1. Repair minor defective surface defects by use of drypack and surface grinding. Specific written approval of Architect/Engineer is required. Submit proposed patching mixture and methods for approval prior to commencing work.
 2. Slabs-on- Ground, Elevated Slabs and on Slabs on Metal Deck: Review for "curled" slab edges and shrinkage cracks prior to installation of other floor finishes. Grind curled edges flush, fill cracks of 1/16 inch and greater with cementitious grout.
 3. Grind high spots, fins or protrusions caused by formwork; Fill-in pour joints, voids, rock pockets, tie holes and other void not impairing structural strength. Provide surfaces flush with surrounding concrete.

3.17 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required compressive strength, lines, details, dimensions, tolerances, finishes or specified requirements; as determined by the Architect/Engineer.
- B. Repair or replacement of defective concrete will be determined by the Architect/Engineer who may order additional testing and inspection at his option. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- C. Specific Defects:
 1. "Low-Strength"; Concrete Not Meeting Specified Compressive Strength after 28 days:
 - a. Concrete with less than 25% Fly Ash or 35% Slag as cementitious material: Test remaining cylinder(s) at 56 days. If strength requirements are met, concrete strength is acceptable.

- b. Concrete with 25% or more Fly Ash or 35% or more Slag as cementitious material: Test remaining cylinder(s) at 70 days. If strength requirements are met, concrete strength is acceptable.
2. Excessive Shrinkage, Cracking, Cracking or Curling; Defective Finish: Remove and replace if repair to acceptable condition is not feasible.
3. Lines, Details, Dimensions, Tolerances: Remove and replace if repair to acceptable condition is not feasible.
4. Slab sections not meeting specified tolerances for trueness/flatness or lines/levels: Remove and replace unless otherwise directed by the Architect/Engineer. Minimum area for removal: Fifteen square feet area unless directed otherwise by the Architect/Engineer.
5. Defective work affecting the strength of the structure or the appearance: Complete removal and replacement of defective concrete, as directed by the Architect/Engineer.

3.18 CLEANING

- A. Maintain site free of debris and rubbish. Remove all materials and apparatus from the premises and streets at completion of work. Remove all drippings; leave the entire work clean and free of debris.
- B. Slabs to Receive Floor Finishes Specified in other sections: Remove non-compatible cure/sealers or other foreign material(s) which may affect bonding of subsequent finishes. Leave in condition to receive work of related sections.

3.19 PROTECTION

- A. Protect completed work from damage until project is complete and accepted by Owner.
- B. Construction Loads: Submit engineering analysis for equipment loads (including all carried loads) specified in article submittals.
- C. Keep finished areas free from all equipment traffic for a minimum of 4 additional days following attainment of design strength and completion of curing.
- D. Protection of Drainage Systems:
 1. Care shall be taken not to introduce any foreign material into any specified drainage, piping or duct system.
 2. Cost of work to repair or clean drainage system as a result of failure to comply with this requirement will be back charged to the contractor.
- E. Cover traffic areas with plywood sheets or other protective devices; maintain protection in place and in good repair for as long as necessary to protect against damage by subsequent construction operations.

END OF SECTION

SECTION 03 30 01 – CAST-IN-PLACE CONCRETE FOR EXTERIOR WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Forms
 - 1. Abutments
 - 2. Foundations
 - 3. Retaining walls
- B. Concrete Reinforcing
 - 1. Detailing
 - 2. Bending
 - 3. Placement
 - 4. Amounts of cover for cast-in-place concrete
 - 5. Anchor bolts
 - 6. Dowels
 - 7. Inserts
 - 8. Lap Splices
- C. Curing Compound and Sealer

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 32 11 23 – Aggregate Base.
- C. Section 32 16 13 – Concrete Curb Gutters and Walks.

1.03 REFERENCE STANDARDS

- A. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
- B. ACI 305R - Hot Weather Concreting
- C. ACI 306R - Cold Weather Concreting
- D. ACI 308 - Standard Specification for Curing Concrete
- E. ACI 309 - Guide for Consolidation of Concrete
- F. ACI 315 - Details and Detailing of Concrete Reinforcement
- G. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary
- H. ASTM C33 - Standard Specification for Concrete Aggregates
- I. ASTM C94 - Standard Specification for Ready-Mixed Concrete
- J. ASTM C150 - Standard Specification for Portland Cement
- K. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- L. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete
- M. ASTM A615 - Standard Specification for Plain Billet-Steel Bars for Concrete Reinforcement
- N. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
- O. ASTM C979 - Standard Specification for Integral Concrete Coloring System
- P. California Code of Regulations (CCR):
 - 1. CCR Title 8, Chapter 4, Subchapter 4 – Construction Safety Orders
 - 2. CCR Title 24, Part 2, California Building Code, Chapter 33, Section 3303, Protection of Pedestrians during Construction or Demolition

1.04 SUBMITTALS

- A. Product Data
 - 1. Curing / Sealing Compounds

22212.00

Sonoma County Library
Healdsburg Library Refresh
139 Piper St

- 2. Admixtures
- 3. Source of Concrete and Aggregates
- B. Shop Drawings
 - 1. Reinforcing Diagrams
 - 2. Bar Schedules
- C. Curing
 - 1. Curing Method
- D. Test Reports
 - 1. Mill Test Reports
 - a. Reinforcing Steel
 - b. Cement
 - 2. Concrete Mix Designs: Trial mixes including water-cement-fly ash ratio curves, concrete mix ingredients and proportions, and admixtures.
 - 3. Grout Mix: To include mix ingredients, strength and shrinkage data.
- E. Delivery: With each batch of concrete, furnish certified delivery tickets listing information in Paragraphs 13.1 and 13.2 of ASTM C94. Maximum delivery temperature of concrete is 100 degrees Fahrenheit (F). Minimum delivery temperature as follows:

Atmospheric Temperature	Minimum Concrete Temperature
30 degrees to 40 degrees F	60 degrees F
0 degrees to 30 degrees F	70 degrees F

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland Cement: Clean, fresh, Type II, low alkali, Portland cement conforming with ASTM C150.
- B. Pozzolan Fly-ash to be in conformance with ASTM C618.
- C. Aggregates

1. Aggregates to be uniformly graded with a one inch maximum size for all concrete mixes.
2. Natural aggregates to be free from deleterious materials, conforming to ASTM C33. Aggregate is not to be potentially reactive as defined in Appendix XI of ASTM C33. Aggregates to be thoroughly and uniformly washed before use.

D. Mixing Water

1. Fresh, clean, potable and free from oil, acid, alkali, organic matter or other deleterious substances.

E. Admixtures

1. Admixtures, if used to be of a type conforming to ASTM C494 that increases the workability of the concrete, will not impair the strength of the concrete, and is not used to reduce the cement content of the mix. Do not use Calcium Chloride.

F. Liquid Membrane-Forming Curing Compound

1. Is to be clear or translucent, suitable for spray application and is to conform to ASTM C309, Type 1.

G. Cement Grout:

1. Non-shrink type composed of one part cement, two parts sand and the minimum amount of water necessary to obtain the desired consistency.

H. Properties

1. 28 day strength of concrete in place to be a minimum of:
 - a. 3,000 psi for walkways, walls and abutments
 - b. 2,500 psi for drilled piers
2. The maximum water/cement ratio to be 0.44 for bridge deck.
3. Slump of concrete and not to exceed four (4) inches unless otherwise authorized by Owner.
4. 15% of cement weight may be Pozzolan Fly-Ash. Pozzolan Fly-Ash to be in conformance with ASTM C618.

2.02 REINFORCING STEEL

- A. Bar reinforcement to be ASTM A615, Grade 60.

PART 3 EXECUTION

3.01 FORMS

- A. Reinforcing detailing, bending, and placing: In accordance with ACI 315 and ACI 318.
- B. Reinforcing steel to be provided with the following amounts of cover for cast-in-place concrete:
 - 1. Concrete deposited against earth: three inches
 - 2. Concrete surface (formed) exposed to earth or weather:
 - a. #6 through #18 bars – two inches
 - b. #5 bar and smaller: 1-1/2 inches
- C. All reinforcing steel, anchor bolts, dowels, and inserts to be accurately placed and securely held in place prior to placing concrete or grout.
- D. Horizontal bars to lap a minimum of 16 gauge black annealed wire chairs or concrete “dobies.”

3.02 MIXING CONCRETE

- A. All concrete materials to be measured accurately for each batch and mixed thoroughly until aggregate is coated with mortar. Combined ingredients to be mixed for a minimum of 1-1/2 minutes.
- B. Concrete batching and mixing to comply with ACI 318 and ASTM C94, delivered to site. Batch mixing at the Site is not permitted

3.03 PLACING CONCRETE

- A. Preparation
 - 1. Remove hardened concrete, wood chips, shavings and other debris from forms.
 - 2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
 - 3. Have reinforcement inspected and approved by Owner before depositing concrete.

4. Forms and reinforcing bars to be clean and wetted prior to placing of the concrete.
5. Place anchor bolts and other embedments, as indicated.

B. Conveying Concrete

1. Convey concrete from mixer to final place of deposit by a method that will prevent segregation. Method of conveying concrete is subject to approval of Owner.

C. Placing

1. Concrete to be placed in conformance with the recommendations of ACI 304.
2. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1-1/2 hours.
3. Deposit concrete as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
4. Do not drop concrete freely more than five feet. Where greater drops are required, use a tremie or flexible spout attached to a suitable hopper.
5. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 20 inches in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
6. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete to be such that no concrete between construction joints will be deposited upon or against partly set concrete.
7. Continuously place all concrete with no more than 10 minutes elapsed time between pours. Sequence concrete pours such that each pour is placed on or adjacent to concrete that has been in place no more than 10 minutes.

D. Consolidation

1. Conform to ACI 309. Immediately after depositing, spade concrete next to forms, into corners and recesses, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator. Vibrate concrete to produce thorough compaction, leaving no voids, complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.

3.04 HOT OR COLD WEATHER

- A. Follow the recommendations of ACI 305R and ACI 306R for hot and cold weather conditions.

3.05 CONCRETE FINISHES

- A. Finish of formed surfaces to be smooth and free of fins, honeycomb, or segregation. When defects occur, they are to be remedied by chipping cavities and patching, or by other methods approved by Owner.
- B. Exposed surfaces to be "sacked" by rubbing cement mortar into voids with burlap or canvas. Fins to be ground smooth and loose mortar to be removed.
- C. Vertical edges of the walls to have 3/4-inch chamfer.
- D. Horizontal edges of the walls to have 1/2-inch chamfer.
- E. Unformed surfaces to be steel troweled to a smooth dense finish. After the trowel finish has sufficiently hardened, walking surfaces of the entire surface to be given a medium broom finish perpendicular to the direction of travel. The broom finish to be applied just prior to the application of the curing compound/sealer.

3.06 PROTECTION AND CURING

- A. In conformance with ACI 308, except as otherwise specified herein.
- B. Initial curing to immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Concrete not covered with membrane or other curing material to be kept continuously wet for at least seven days after placing. High-early-strength concrete net curing period to be not less than three days. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by Owner.
 - 1. Liquid Curing and Sealing Compounds
 - a. Apply by spray or roller in accordance with the manufacturer's instructions. Apply immediately after finishing. Maximum coverage to be 400 square feet per gallon on steel troweled surfaces, and 300 square feet per gallon on floated or broomed surfaces for the curing/sealing compound.

- 2. Plastic sheets

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- a. Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets two inches. Tightly seal joints with tape.
3. Paper
 - a. Utilize widest practical width paper and overlap adjacent sheets two inches. Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.
 - C. Provisions are to be made to keep overspray for curing/sealing compounds from extending beyond bridge deck surface. Spray of curing/sealing compounds to cease if sustained winds exceed 10 miles per hour.

3.07 CLEANING

- A. Cleaning of equipment for delivery or placement of concrete is prohibited on site.

3.08 ACCEPTANCE

- A. Walking surfaces are to be free from trowel marks, uniform in appearance and with a surface plane tolerance not exceeding 1/4 inches in any 10 foot 0 inch when tested with a ten foot straightedge.

END OF SECTION

SECTION 04 26 13 - MASONRY VENEER**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Clay facing brick. - Remove and salvage existing brick for re-install at new openings
- B. Mortar and grout.
- C. Reinforcement and anchorage.
- D. Flashings.
- E. Installation of lintels.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
- B. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.
- C. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- D. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- E. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2019.
- F. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019.
- G. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.
- H. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- I. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).
- J. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
- K. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
- L. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.

- M. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.04 SUBMITTALS

- A. Product Data: Provide data for masonry units and mortar.

1.05 FIELD CONDITIONS

PART 2 PRODUCTS

2.01 BRICK UNITS

- A. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
 - 1. Color and Texture: Match existing.
 - 2. Nominal Size: Match existing.

2.02 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M Type N.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Aggregate: ASTM C144.
- D. Grout Aggregate: ASTM C404.
- E. Water: Clean and potable.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
 - 1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
 - 2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
 - 3. Vertical adjustment: Not less than 3-1/2 inches.
- B. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.

2.04 FLASHINGS

- A. Metal Flashing Materials:
 - 1. Prefabricated Metal Flashing: Smooth fabricated prefinished galvanized sheet metal flashing for surface mounted, sill flashing, pan, or apron flashing conditions.

- a. Steel sheet metallic coated by hot-dip process and prepainted by coil-coating process to comply with ASTM A755
- B. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

2.05 ACCESSORIES

- A. Building Paper: ASTM D226/D226M, Type I ("No. 15") asphalt felt.
- B. Weeps:
 - 1. Type: Preformed aluminum vents with sloping louvers.
- C. Cavity Vents:
 - 1. Type: Polyester mesh.
- D. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.06 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, Proportion Specification.
- B. Grout: ASTM C476; consistency as required to fill volumes completely for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Match existing, field verify
 - 3. Mortar Joints: Match existing, field verify

3.03 WEEPS/CAVITY VENTS

- A. Install weeps in veneer walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install cavity vents in veneer walls at 32 inches on center horizontally below shelf angles and lintels and at top of walls.

3.04 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

3.05 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.
- E. Lap joint reinforcement ends minimum 6 inches.
- F. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

3.06 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
- B. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.
- C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.07 LINTELS

- A. Maintain minimum 8 inch bearing on each side of opening.

3.08 TOLERANCES

- A. Install masonry within the site tolerances found in TMS 402/602.
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.09 CUTTING AND FITTING

- A. Cut and fit for penetration and openings. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.10 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.11 PROTECTION

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SECTION 05 11 00 - STRUCTURAL AND MISCELLANEOUS STEEL**PART 1 GENERAL****1.01 SUMMARY**

- A. Section Includes: All labor, materials, equipment and operations required to complete structural and miscellaneous metals in shapes and configurations indicated; including:
1. Structural steel columns, beams, bracing, base plates, bolts, joist hangers, and stud bolts welded to structural steel.
 2. Miscellaneous structural steel and connections; fabricated connectors and hangers installed by related sections.
 3. Anchor bolts and steel inserts embedded in concrete or masonry, installed by related sections.
 4. Fabricated steel items embedded in concrete or masonry installed by related sections.
 5. Supervision of anchor bolt setting, leveling and elevations to ensure required fit of steel work.
 6. Shop priming and field touch-up, galvanizing.
 7. Bracing, Shoring, Fabrication and Erection.
- B. Related Sections:
1. Pertinent sections of Division 01 specifying Quality Control and Testing Agency services.
 2. Pertinent Sections of other Divisions specifying concrete reinforcement, formwork, concrete, structural and miscellaneous metal fabrications, steel joists, metal decking, cold-formed metal framing, rough carpentry.

1.02 REFERENCES

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 22 Steel.
- B. American Institute of Steel Construction (AISC) 303 "Code of Standard Practice for Steel Buildings and Bridges".
- C. AISC 360 "Specification for Structural Steel Buildings".
- D. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".

E. Underwriters Laboratories (UL) FRD "Fire Resistance Directory".

1.03 SUBMITTALS

- A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer. Submittals that do not meet these requirements will be returned for correction without review.
- B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents.
- C. Product Data: Submit manufacturer's product data, specifications, location and installation instructions for proprietary materials and reinforcement accessories. Provide samples of these items upon request.
- D. Shop drawings: Submit each building as a complete unit. Do not mix components from multiple buildings or units of work in a submittal. Include all of the following;
1. Profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 2. Fabrication tolerances for all steel.
 3. Connections: All, including type and location of shop and field connections.
 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths, type, size, and sequence. Designate demand critical welds.
 5. Cross-reference all shop drawing detail references to contract document detail references.
 6. Secure all field measurements as necessary to complete this work prior to submitting shop drawings for review.
 7. Provide holes, welded studs, etc. as necessary to secure work of other sections.
 8. Provide the following as separate submittals for each building or unit of work:
 - a. Bolt and anchor setting plans.
 - b. Layout, fabrication and erection drawings.
- E. Certifications:
1. Steel Materials: Submit the following for identified materials.

- a. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
 - b. Mill Test Reports: Indicate structural strength, destructive test analysis, and non-destructive test analysis.
 - c. Contractor's affidavit certifying that all identified steel materials provided are of the grades specified and match the certificates supplied.
2. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification per AWS D1.1.
- F. Samples: Provide samples to the Testing Agency as specified in Article SOURCE QUALITY CONTROL, at no additional costs.

1.04 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies, refer to pertinent sections of Division 01 and CBC Chapter 17.
- B. All tests shall be performed by a recognized testing agency as specified in pertinent sections of Division 01.
- C. Certification and Identification of Materials and Uses: Provide Testing Agency with access to fabrication plant to facilitate inspection of steel. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection and all material identification/test information listed below.
 - 1. Test all steel as required by ASTM A6.
 - 2. Provide manufacturer's Mill Test Reports for all materials. Include chemical and physical properties of the material for each heat number manufactured. Tag all fabricated materials with heat number.
 - 3. Provide letter certifying all materials supplied are from heat numbers covered by supplied mill certificates. Include in letter the physical location of each material type and/or heat number in the project (i.e. walls, braced frames etc.).
 - 4. Unidentified Material Tests: Where identification of materials by heat number or mill tests cannot be made, Owner's Testing Agency shall test unidentified materials.
 - 5. Provide all certification, verifications, and other test data required to substantiate specified material properties at no additional cost to the Owner.
- D. Testing and Inspection: Tests and Inspections performed by Independent Testing Agency are specified below in Articles SOURCE QUALITY CONTROL and FIELD QUALITY

CONTROL. Duties and limitations of Independent Testing Agency, test costs and test reports in conformance with pertinent sections of Division 01.

- E. The following standards are the minimum level of quality required. Provide higher quality work as specifically indicated in the Contract Documents.
 - 1. Workmanship and details of structural steel work shall conform to the CBC and AISC 360.
 - 2. The quality of materials and the fabrication of all welded connections shall conform to AWS D1.1.
 - 3. Comply with Section 10 of AISC 303 for architecturally exposed structural steel.
- F. The Testing Agency will review all submittals and testing of materials.
- G. All re-inspections made necessary by non-conforming work shall be at the Contractor's expense.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project site in bundles marked with durable tags indicating heat number, mill, member size and length, proposed location in the structure and other information corresponding with markings shown on placement diagrams.
- B. Handle and store materials above ground to prevent damage, contamination or accumulation of dirt or rust.

1.06 SCHEDULING AND SEQUENCING

- A. Organize the work and employ shop and field crew(s) of sufficient size to minimize inspections by the Testing Agency.
- B. Provide schedule and sequence information to Testing Agency in writing upon request. Update information as work progresses.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Structural Steel W Shapes: ASTM A992 Gr. 50 or ASTM A572 Gr. 50.
- B. Structural Steel Plates: ASTM A36 or ASTM A572 Gr. 50 or ASTM A529 Gr. 50
- C. Structural Steel Channels, Angles: ASTM A36 or ASTM A572 Gr. 50.
- D. HSS (Hollow Structural Sections):

1. Round: ASTM A500, Gr. C.
 2. Rectangular or Square: ASTM A500, Gr. C.
- E. Pipe: ASTM A53, Grade B.
- F. Bolts, Nuts, and Washers: ASTM A307 Grade A machine bolts with ASTM A563 Grade A nuts and ASTM F844 washers to match. See FINISHES section for galvanization, where required.
- G. Anchor Bolts/Rods, Nuts, and Washers: ASTM F1554 Gr. 36 or 55 with ASTM A563 Grade A nuts and ASTM F436 Type 1 washers. Grade DH nuts where Grade 105 rod is specified. No upset thread allowed.
- H. Arc-Welding Electrodes: AWS Standards E70 or equivalent, except no E70T-4 allowed.
- I. Other Welding Materials: AWS D1.1; type required for materials being welded.
- J. Welded Headed/Threaded Studs: ASTM A108 and AWS D1.1 Section 7. Minimum yield strength is 51,000 pounds per square inch.
- K. Deformed Bar Anchors: ASTM A1064.

2.02 ACCESSORIES

- A. High Strength Grout: ASTM C1107, non-shrink, premixed compound consisting of aggregate, cement, and water reducing plasticizing agents. Minimum compressive strength $f_c = 7000$ psi at 28 days, placed in a "fluid" state. Non-metallic where exposed to view. BASF "MasterFlow 928" or equivalent.
- B. Building Structural Steel Primers: Comply with local VOC limitations of authorities having jurisdiction and the California Green Building Code. Verify compatibility with finish coats specified in other sections. Follow manufacturers printed instructions. Apply one coat unless otherwise directed.
1. Type A: Self-Crosslinking Hydrophobic Acrylic passing 2000 hours ASTM D4585 and 7000 hours ASTM D5894. "Series 115 Uni-Bond DF" by Tnemec (2.0 to 4.0 mils DFT).
 2. Type B: Organic Zinc-Rich Urethane passing 50,000 hours ASTM B117 and 15000 hours ASTM G85. "Series 90-97 Tneme-Zinc" by Tnemec (2.5 to 3.5 mils DFT) or "Series 94-H20 Hydro-Zinc" by Tnemec (2.5 to 3.5 mils DFT).
 3. Type C: MIO-Zinc Filled Urethane passing 10,000 hours ASTM B117 and 5000 hours ASTM D4585. "Series 394 PerimePrime" by Tnemec (2.5 to 3.5 mils DFT).
- C. Galvanizing: ASTM A153 and A123.

- D. Touch-Up Primer for Galvanized Surfaces: Type B primer.

2.03 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Continuously seal built up members by continuous welds where exposed to weather.
- C. Fabricate connections for bolt, nut, and washer connectors.
- D. Protect all materials, before and after fabrication, from rust, corrosion, dirt, grease, and other foreign matter.
- E. Fabricate framing members free from twists or bends. Form holes, cut and sheared edges neatly without kinks, burrs, or warped edges.
- F. Exposed Steel: Straight, smooth, free of nicks, scars or dents.
- G. Gas Cutting: Gas cutting of holes in a member shall not be permitted.
- H. Splicing of members: Members requiring splicing due to length requirements may be spliced using full penetration butt welds when such welds and procedures are inspected and certified by the Testing Agency, in conformance with AWS and AISC standards. The location of splices shall be approved by the Architect/Engineer in writing prior to fabrication.
- I. Welding: Welding of structural steel connections shall be performed by qualified welders in accordance with AWS Standards. All weld sizes shall match those shown on the drawings.
 - 1. Preparation: Clean all surfaces free of rust, paint and all foreign matter. Remove paint or scale by brushing, chipping or hammering as required. Chip clean and wire brush burned or flame cut edges before welding. Space and alternate welds, clamping as necessary to prevent warp or misalignment.
 - 2. Sequence Welding: When welds enclose, or partially enclose, the perimeter or portion of the surface of a member, make weld bead in sequence, or staggered. Minimize internal stresses. Weld groups of members occurring in a single line in staggered sequence to minimize distortion of the structural frame.
 - 3. Faulty and Defective Welding: Welds failing to meet AWS standards and the Contract Documents shall be rejected and remade at Contractor expense. All welds showing cracks, slag inclusion, lack of fusion, bad undercut or other defects, ascertained by visual or other means of inspection shall be removed and replaced with conforming work.
 - 4. Minimum Weld Strengths: All welds shall match the minimum weld sizes recommended by AISC. Details of fabrication not specifically shown shall match similar

details which are specifically shown. All bevel and groove welds shall be full penetration unless size is noted otherwise.

5. Threaded studs, headed studs, and deformed bar anchors shall be full-fusion welded conforming to ASW D1.1.
- J. Camber: Fabricate all beams cambered as indicated on the drawings.
 1. Fabricate beams without camber for installation with any "natural" crown up.
 2. Exception: Fabricate cantilever beams with "crown" down.
- K. Grinding: Grind smooth the following structural steel and connections;
 1. Exposed cut ends of structural and fabricated shapes.
 2. All welds exposed to view.
 3. Mitered and fit-up corners and intersections.
- L. Back-Up Bars: Required for all complete penetration welds.
- M. Bolt Holes: Edge, end distances and spacing shall conform to dimensions shown on the drawings, and as follows;
 1. Round: Size indicated and 1/16 inch maximum oversize, except 1 inch and larger bolts may have 1/8 inch maximum oversize.
 2. Slotted: At locations specifically noted on the drawings, provide size indicated and 1/16 inch by 1/4 inch oversize slotted in direction perpendicular to applied loads.
 3. Holes in base plates for anchor bolts may be 1/8 inch oversize.
- N. Comply with Section 10 of AISC 303 for architecturally exposed structural steel (AESS). See architectural & structural drawings for locations of AESS.

2.04 FINISHES

- A. Steel exposed to inclement atmospheric conditions or weather (such as coastal moisture or seasonal rain) shall be sufficiently primed or otherwise protected against corrosion. If condition of steel is suspect due to weathering/corrosion, Contractor shall bear cost of inspection to determine if excessive corrosion is present and if steel member(s) requires repair or replacement. Contractor shall bear cost of repair or replacement.
- B. Prepare and finish structural and miscellaneous steel component surfaces as follows, unless a higher standard-of-care is determined necessary per item A:
 1. Unpainted, interior, dry exposure surfaces need not be primed.

2. Finished painted, interior, dry exposure surfaces:
 - a. Surface Preparation: SSPC-SP2 Hand-Tool and/or SP3 Power-Tool Cleaning. Apply Primer Type A. Field touchup with same primer.
 - b. Where jobsite exposure is expected to exceed 6 months, SSPC-SP6 / NACE No. 3 Commercial Blast-Cleaning is required. Apply Primer Type B or C. Field touchup with same primer.
 3. Finish painted surfaces with exterior exposure, interior exposure subject to wet conditions or fumes, or surfaces to receive high performance finish coatings (for example epoxy or urethane coatings).
 - a. Surface Preparation: SSPC-SP6 / NACE No. 3 Commercial Blast-Cleaning to create a dense, uniform angular surface profile of 2.0 mils minimum. For severe (immersion) exposure, SSPC-SP10 / NACE No. 2 Near-White Blast-Cleaning is required.
 - b. Apply Primer Type B. Field touchup with same primer.
 4. Surfaces to be fire proofed need not be primed unless required by the fireproofing manufacturer or if jobsite exposure is expected to be inclement per item A. Where unprimed steel is to receive fireproofing, prepare steel surface as required by fireproofing manufacturer. If fireproofed surfaces are to be primed, provide primer as follows:
 - a. Surface Preparation: SSPC-SP3 Power-Tool Cleaning.
 - b. Apply Primer Type C. Field touchup with same primer.
 5. Exterior exposed (unpainted) surfaces and as otherwise indicated to receive galvanizing:
 - a. Galvanize per ASTM A123 Class 55 minimum. Passivation agents are not permitted on galvanized metal that is to be painted. Provide vent holes per ASTM A385 at closed sections (such as HSS). Submit proposed location of vent holes for review by Engineer.
 - b. Connection hardware shall be hot-dip galvanized per ASTM A153 or F2329. Mating bolts and nuts shall receive the same zinc-coating process.
 - c. Repair all uncoated, damaged, or altered galvanized surfaces per ASTM A780.
- C. Do not prime the following surfaces unless otherwise indicated:
1. Connections to be field welded.

2. Steel in contact with concrete.
 3. Surfaces to receive welded metal decking.
- D. Do not cover up work with finish materials until inspection is complete and work is approved by the Testing Agency.

2.05 SOURCE QUALITY CONTROL

- A. An independent Testing Agency will perform source quality control tests and submit reports, as specified in pertinent sections of Division 01.
- B. Steel Materials Testing:
1. No testing is required for materials identified in accordance with CBC 2202.1 (heat number, grade stencil, etc.).
 2. Unidentified steel- General: Test all structural shapes. In addition, test to verify F_y and F_u values when engineering requirements exceed $F_y = 25$ ksi for design.
- C. Shop Welding Inspection:
1. Testing Agency shall inspect and certify all structural welds, unless the fabricating shop has been accredited in conformance with CBC requirements. Submit certification to the Architect/Engineer for review and the Building Official for approval.
 2. Welder Qualifications: Welding inspector shall verify that all the welders are properly qualified prior to steel fabrication and state the qualifications of each welder in the welding inspection report.
 3. Welding Inspection: Continuous inspection required unless otherwise noted below. Comply with requirements of AWS D1.1.
 - a. Welding Inspector shall check all welds, materials, equipment and procedures.
 - b. Welding Inspector shall provide reports certifying the welding is as required and has been done in conformity with the plans, specifications and codes.
 - c. Welding Inspector shall use radiographic, ultrasonic, magnetic particle, or any other necessary aid to visual inspection to assure adequacy of welds.
 4. Periodic Inspection Acceptable:
 - a. Single pass fillet welds not exceeding 5/16 inch.
- D. Bolts, Nuts, and Washers: Provide samples to Testing Agency for required testing, at no additional cost.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Framing:
 - 1. Erect all structural steel true and plumb.
 - 2. Verify proper final alignment prior to making final connections.
- C. Field Connections:
 - 1. Workmanship of field bolted and welded connections shall conform in all respects to methods and tolerances specified for fabrication.
 - 2. Field weld components indicated on shop drawings. Sequence field welds to minimize built-up stress and distortion of the structural frame. Verify sequence with Engineer. Coordinate field welding schedule with Testing Laboratory.
 - 3. Welded Studs: Install in accordance with manufacturer's instructions and structural welding code AWS D1.1.
- D. Templates: Provide bolt setting templates for all anchor bolts. Provide instructions for the setting of anchors and bearing plates, verify these items are set correctly as work progresses.
- E. Column base plates: Set level to correct elevations, support temporarily on steel wedges, shims, or leveling nuts where shown, until the supported members are plumbed and base plate is grouted.
 - 1. Grout solid the full bearing area under base plates prior to installation of floor and/or roof decks.
 - 2. Comply with manufacturer's instructions for high strength grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees, or form edges vertical 1in-2in away from base plate edges. Top of grout outside of base plate footprint shall not extend higher than bottom of base plate.

F. Bolting:

1. Inspect mating surfaces to ensure that bolt head and nut will have full bearing and that metal plies will mate flush between bolts.
2. Install bolts in matching holes. Do not distort metal or enlarge holes by drifting during assembly. Remake mismatched components to achieve tolerances indicated.
3. Holes mismatched in excess of 1/8 inch will be rejected.
4. Holes mismatched less than 1/8 inch may be reamed to the next larger size bolt.
5. Do not enlarge holes by flame cutting or air/arc ("plasma") cutting.
6. Provide flat washer(s) at over-size holes.
7. Provide washer at bolt head and nut where connected part is less than ¼ inch thick.
8. Provide ASTM F436 beveled washers when the slope of the surfaces of parts in contact with the bolt head or nut is greater than 1:20.
9. Do not install bolts with damaged threads.
10. Threads shall commence outside of the shear plane.
11. Machine Bolts (MB): Install and tighten to a snug condition (ST) such that laminated surfaces bear fully on one another, using an impact wrench or "full effort" of an installer using a standard spud wrench.

G. Supports, Shoring and Bracing: Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing. Conform to requirements of all applicable laws and governing safety regulations. Resist imposed loads, including those of stored materials and equipment.

1. Provide all temporary supports, shoring and bracing necessary to achieve work of tolerances indicated.
2. Provide all necessary temporary flooring, planking and scaffolding required for erection of steel, and support of erection machinery.
3. Construction Loading: Do not overload the structure or temporary supports with stored materials, equipment or other loads.
4. Maintain temporary bracing and shoring until work is complete, and longer as required to ensure stability and safety of structure.

H. Do not make final connections until structure is aligned to meet specified tolerances.

3.03 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

- A. The independent Testing Agency will perform field quality control tests, as specified in pertinent sections of Division 01.
- B. Field Welding Inspection: Conform to all requirements of section SOURCE QUALITY CONTROL.
 - 1. Inspect mating surfaces.
 - 2. Test all materials prior to use. Use only materials meeting specified requirements.

3.05 ADJUSTING

- A. Touch-up damaged finishes with compatible specified primer.
- B. Replace defective or damaged work with conforming work. Replace all defective work at Contractor's expense.
- C. Straighten materials by means that will not injure the materials.
- D. Replace defective or damaged work which cannot be corrected in the field with new work, or return defective items to the shop for repair.
- E. Architect/Engineer shall review all proposals for the repair or replacement of damaged, defective, or missing work.
- F. Pay expenses incurred by Owner for Architect/Engineer's costs for (re-)design and obtaining approvals of Authorities Having Jurisdiction (AHJ) necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work, as specified in pertinent sections of Division 01.
- G. Pay expenses due to re-testing and re-inspection necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work, as specified in pertinent sections of Division 01.

3.06 CLEANING AND PROTECTION

- A. Clean all surfaces upon completion of erection; leave free of grime and dirt. Remove unused materials, tools, equipment and debris from the premises and leave surfaces broomed clean.
- B. Protect work from damage by subsequent operations.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Shop fabricated steel items.
- B. Miscellaneous Framing Accessories:

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 03 30 00 - Cast-In-Place Concrete:: Placement of metal fabrications in concrete.
- C. Section 09 90 00 - Painting and Coating: Field-applied paint finishes.
- D. Section 12 36 00 - Countertops.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
- E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2022.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- I. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.

- J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
- L. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- M. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
- N. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.04 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Product Data for CALGreen 5.504.4.3 – Finish Material Pollutant Control; Architectural paints and coatings, including printed statement of VOC content and chemical components.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths and weld locations.
- C. Provide templates for anchors and bolts specified for installation under other Sections.
- D. Where concrete inserts are required, show size and locations required.

1.05 QUALITY ASSURANCE

- A. Design Criteria
 - 1. Work shall be designed to support normally imposed loads and conform to AISC requirements.
 - 2. Built-up parts shall not exhibit warp
- B. Welding Standards: Comply with applicable provisions of AWS D1.1 and AWS D1.3.
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.
- F. Slotted Channel Fittings: ASTM A1011/A1011M.
- G. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.
- H. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- I. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- J. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- K. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction, including CALGreen.
- L. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction, including CALGreen.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Miscellaneous Framing Accessories:
 - 1. Low wall support stud and baseplate for support of cantilevered pony wall framing as detailed, prime paint finish.
- B. Lintels: As detailed; prime paint finish.

2.04 FINISHES - STEEL

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Architectural Paints and Coatings including aerosol paint and coating systems.
- B. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and all exterior items.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- C. Prepare surfaces to be primed in accordance with SSPC-SP2.
- D. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- E. Prime Painting: One coat.
 - 1. Primer for Interior and Exterior Ferrous, Non-Ferrous, Galvanized Metal, and Aluminum Primer: Factory-formulated acrylic water-based rust-inhibitive metal primer. Apply at a dry film thickness of not less than 2.2 mils
 - a. Basis of Design: PPG Paints; 4020 PF Series Pitt-Tech Plus Interior/Exterior DTM Industrial Primer (91 g/L VOC).
 - 2. Primer for Items Indicated to Receive High Performance Coating: Shop-apply.
 - a. Basis of Design: PPG Amercoat 68HS Zinc Rich Epoxy.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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SECTION 06 10 00 - ROUGH CARPENTRY**PART 1 GENERAL****1.01 SUMMARY**

- A. Section Includes: All labor, materials and equipment and all operations required to complete all rough carpentry and structural framing as indicated on the drawings; to produce shapes and configurations as shown, as required; and as specified herein, including:
1. Structural floor, wall, and roof framing.
 2. Floor, wall, and roof sheathing.
 3. Rough hardware, framing connectors and fasteners.
 4. Treatment of wood.
 5. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, and other work requiring supporting blocking.
 6. Miscellaneous wood nailers and furring strips, including roof applications, other wood framing, furring, shims or blocking as required to complete the work.
- B. Related Sections:
1. Pertinent sections of Division 01 specifying Quality Control and Testing Agency services.
 2. Pertinent sections of Division 01 specifying Structural Product Requirements: Structural Product Options, Substitution procedures and limitations, transportation, handling and storage.
 3. Pertinent sections of Division 03 specifying wood formwork construction and/or setting anchors in concrete.
 4. Pertinent section of Division 06 specifying wood construction and materials.
 5. Pertinent sections of other divisions specifying steel or concrete construction.

1.02 REFERENCES

- A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 23 Wood.
- B. American National Standards Institute (ANSI) / American Wood Council (AWC) "NDS - National Design Specification for Wood Construction".

- C. National Institute of Standards and Technology (NIST) / Engineered Wood Association (APA) "PS 1 - Voluntary Product Standard for Structural Plywood".
- D. NIST / APA "PS 2 - Performance Standard for Wood-Based Structural-Use Panels".
- E. NIST "PS 20 - American Softwood Lumber Standard".
- F. Redwood Inspection Bureau (RIS) "Standard Specifications for Grades of California Redwood Lumber".
- G. West Coast Lumber Inspection Bureau (WCLIB) "Standard Grading Rules for West Coast Lumber No. 17".
- H. Western Wood Products Association (WWPA) "Western Lumber Grading Rules".
- I. American Wood Preservers Association (AWPA) "Book of Standards".

1.03 SUBMITTALS

- A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. Submit for review prior to fabrication. Submittals that do not meet these requirements will be returned for correction without review.
 - 1. Substitutions for products specified require conformance to substitution requirements in Division 01.
 - 2. Review of materials and hardware for substitution to products specified is at the additional expense of the Contractor.
- B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer.
- C. Product Data:
 - 1. Submit manufacturer's product data, specifications, and installation instructions for & location of framing connectors, wood preservative materials, application instructions, and fasteners. Include complete, accurate equivalence data when submitting alternate products to those specified. Provide samples of these items upon request.
 - 2. Submit product data and current ICC-ES report for machine-driven nails, fasteners, and equipment, including dimensions of all fasteners, including head, shank diameter and length.

- D. Shop drawings: For manufactured wood products, submit each building as a complete unit. Do not mix components from multiple buildings or units of work in a submittal. Include all of the following;
1. Indicate profiles, sizes, and spacing locations of structural members.
 2. Cross-reference all shop drawing detail references to contract document detail references.
 3. Secure all field measurements as necessary to complete this work.
- E. Manufacturer's Certificate: Submit all certifications of physical and chemical properties of materials as specified below in Article titled QUALITY ASSURANCE.
1. Certify that wood products supplied for rough carpentry meet or exceed specified requirements, including specified moisture content.

1.04 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies, refer to pertinent sections of Division 01 and CBC Chapter 17.
- B. All tests shall be performed by a recognized testing agency as specified in pertinent sections of Division 01.
- C. Inspection of fabricators is required per CBC 1704.2.5 unless fabricator is registered and approved by the building official. Wood product quality standards:
1. All wood products to comply with article REFERENCES.
 2. Factory-mark each piece of lumber and sheathing with type, grade, mill, and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.
 3. Sheathing panels to be marked by APA (The Engineered Wood Association).
- D. End-Jointed lumber shall not be used.
- E. Hardware and engineered wood products shall have current ICC ES Evaluation/research reports that are equivalent to products specified.
- F. Employ competent workers experienced in work of the types specified and required.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent requirements of Division 01.

- B. Delivery: Time delivery and installation of carpentry products to avoid delaying other trades whose work is dependent on or affected by this section and to comply with moisture content, protection and storage requirements.
- C. Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and sheathing panels to prevent deformation and provide air circulation within stacks.
 - 1. Store materials for which a maximum moisture content is specified only in areas where relative humidity has been reduced to a level where specified moisture content can be maintained.
 - 2. Handle and store materials above ground to prevent damage, contamination, or accumulation of dirt or foreign materials.
 - 3. Provide special protection for horizontal sheathing panels. Deformation of panels due to moisture is not acceptable.

1.06 PROJECT/SITE CONDITIONS

- A. Verify all conditions at project site affecting the work; work to field dimensions as required. Coordinate carpentry installation with size, location, and installation of service utilities.
- B. Sequence rough carpentry installation activities to allow sufficient time for:
 - 1. Review of all submittals.
 - 2. Indicate submittal review, procurement, and testing activities in the project schedule prior to the start of installation. Installation durations shall be based on hand-nailed installation methods specified.
 - 3. Attainment of specified maximum lumber moisture content.

PART 2 PRODUCTS

2.01 DIMENSIONED LUMBER

- A. General
 - 1. Size per industry standards for nominal sizes shown; S4S (sanded four sides).
 - 2. Warped/twisted and excessively checked members shall not be used regardless of grade marks.
 - 3. At the Contractor's option, engineered lumber of equivalent size and material properties may be substituted for solid sawn lumber where material is difficult to source

due to length, availability, etc. Submit proposed substitution to Engineer for review prior to purchasing materials.

- B. Moisture content of framing:
1. All lumber to be maximum 19% at time of fastener installation. All lumber to be maximum 19% at time of close-in, unless noted otherwise.
 2. The Owner's Testing Laboratory will test for moisture content prior to commencement of close-in.
 3. The Contractor shall recognize that excessive shrinkage of lumber results from excess moisture content at the time of installation. The Contractor will compensate for use of such lumber by waiting for acceptable moisture content before close in and/or by replacing/repairing lumber that has sagged, twisted, or warped prior to close in.
 4. Deviation from this specification would require structural redesign of connections and fasteners.
- C. Sills/ledgers on concrete or masonry: No. 2 pressure treated Douglas Fir and as called for on the drawings.
- D. Interior structural framing shall be Douglas Fir (D.F.) with grades as noted below, unless otherwise specified on the drawings. All grades are per WCLIB standard grading rules.
1. All permanently exposed (interior or protected from weather) framing shall be select structural grade with no box heart.
 2. Except per 1 above, unless noted otherwise, minimum grades are:
 - a. Floor/roof joists/rafters (2x) and 2x8 & larger studs: D.F. No. 2
 - b. 2x4 and 2x6 studs and plates: D.F. No. 2
 - c. 4x and larger: D.F. No. 1
 - d. Blocking: D.F. No. 2
 - e. 6x8 and larger posts and beams may be SGL/CGL per below unless noted otherwise on the drawings.
- E. Exterior structural framing (exposed to weather) shall be redwood select structural grade or pressure treated D.F. No. 1, unless noted otherwise.
- F. Structural decking shall be D.F. select decking or White Pine select where not exposed to moisture. Where directly exposed to moisture or high humidity for prolonged periods of

time, decking shall be Alaskan Yellow Cedar or Port Orford Cedar. Moisture content at time of installation to be less than 12%.

- G. Framing not otherwise shown or specified: Douglas Fir construction grade per WCLIB paragraphs applicable to uses and sizes required.

2.02 MANUFACTURED LUMBER

- A. Structural (Certified) Glued Lumber (SGL): SGL shall be manufactured following the American Lumber Standards Committee (ALSC) "Glued Lumber Policy" and meet the requirements of Voluntary Product Standard PS 20 "American Softwood Lumber Standard". Grading shall be per the West Coast Lumber Inspection Bureau (WCLIB) or Western Wood Products Association (WWPA). SGL shall be manufactured with waterproof adhesive. "Stud use only" SGL is not permitted.
1. Acceptable products:
 - a. "RMT" by Rosboro.
 - b. Approved equal.
 2. Where specified for use on plan, SGL shall be entirely Douglas Fir lumber. SGL shall be grademarked to match the grade as would be specified for solid sawn lumber in the same location/use.
 3. At the contractor's option, SGL may be substituted for solid sawn lumber. SGL species and grade shall match that for the solid sawn member. SGL shall not be substituted for glued-laminated (glulam) members.
- B. Laminated Veneer Lumber (LVL): for use as joists, beams, blocking, or studs when so noted on the drawings. Conform to ICC AC 47. Minimum Fb = 2,600 PSI. Minimum E=2,000,000 PSI. Acceptable products:
1. "Microllam LVL" by Trus Joist, ICC ESR-1387
 2. "Redlam LVL" by RedBuilt, ICC ESR-2993
 3. Approved equal
- C. Laminated Strand Lumber (LSL): for use as blocking (flat or vertical) or rim joist when used with I-joist or LVL, when so noted on the drawings. Conform to ICC AC 124. Minimum Fb = 1,700 PSI. Minimum E=1,300,000 PSI. Acceptable products:
1. "Timberstrand LSL" by Trus Joist, ICC ESR-1387
 2. "Redlam LSL" by Redbuilt, ICC ESR-1387

3. Approved equal
- D. Parallel Strand Lumber (PSL): for use as beams and posts when so noted on the drawings. Conform to ICC AC 47. Minimum material properties for beams: E = 2,200,000 psi; Fb = 2,900 psi; Fc = 2,900 psi (parallel); Fv = 290 psi. Minimum material properties for posts: E = 1,800,000 psi; Fb = 2,400 psi; Fc = 2,500 psi (parallel); Fv = 190 psi. Acceptable products:
 1. "Parallam PSL" by Trus Joist, ICC ESR-1387
 2. Approved equal

2.03 STRUCTURAL SHEATHING PANELS

- A. Plywood: Structural sheathing shall conform to product standard PS-1 or PS-2. All panels shall have a minimum bond classification of "Exposure 1" and bear the trademark of the Engineered Wood Association (APA) or other qualified agency. Grades shall be "Rated Sheathing" or "Structural 1" as required on the drawings.
- B. Oriented Strand Board (OSB): All structural OSB shall be grade marked by a qualified agency for conformance with Product Standard PS-2 and shall be fabricated with exterior glue. Grades shall be as required on the drawings.

2.04 TREATED WOOD:

- A. Treated Lumber and Plywood: Comply with requirements of AWPA Standard U1. See Standard U1 for "Use Category" designations. Do not provide higher Use Category lumber than that specified. Maximum moisture content shall be the same as required for "dimensioned lumber" as specified above.
- B. Preservative Treated Lumber
 1. General
 - a. Preservatives shall be waterborne. Preservative retention rate shall be as required per AWPA Standards U1 & T1. Lumber shall be Douglas Fir No. 2 (or better). Cut faces of treated wood shall be brush treated (two complete applications) prior to installation.
 - b. Lumber less than 8 inches above grade and lumber less than 6 inches above exterior hard-surface flatwork shall be treated.
 - c. Each piece of wood shall be stamped by the wood preservative applicator to identify its treatment and preservative retention.
 2. Lumber at interior, non-weather exposed locations installed adjacent to concrete or masonry shall be Use Category UC2. Examples include sill plates & ledgers and

lumber in contact with roofing, flashing, or water proofing. Borate treated lumber meeting AWPA UC2 is acceptable in this application.

3. Lumber at exterior locations, not in contact with soil/ground, shall be Use Category UC3B. Examples include Douglas Fir decking and deck framing.
 4. Lumber in contact with soil/ground shall be Use Category UC4A. Examples include timber retaining walls.
 5. Poles, posts, and sheathing panels shall be treated as recommended by AWPA Standard U1 per use and exposure.
 6. Maximum Volatile Organic Compound (VOC) content of field-applied preservative shall meet local air quality standards and the California Green Building Code. Provide either of the following:
 - a. Copper Azole (CA-B) per ICC-ES AC326.
 - b. Alkaline/Copper/Quaternary (ACQ).
- C. Fire Retardant Treatment: Product and application process must be recommended by manufacturer of treatment as being suitable for painting. Application shall be by a California State Fire Marshal approved licensed contractor.
1. Exterior Type: Use Category UCFB, chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Treat exposed exterior rough carpentry items, including stairways, balconies, and covered walkways.
 - b. Do not use treated wood in direct contact with the ground.
 2. Interior Type: Use Category UCFA, low temperature (low hygroscopic) type, chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Treat rough carpentry items as indicated.
 - b. Do not use treated wood in applications exposed to weather or where the wood may become wet.

2.05 FASTENERS AND ACCESSORIES

A. General requirements for fasteners:

1. Fasteners shall be of adequate size, spacing, and number to resist design loads under intended use, and types shall be appropriate for the materials or conditions for which used.
2. Provide washers, pre-drilling, etc. as required for proper installation and to prevent damage to framing.
3. Fasteners shall be hot-dip galvanized (ASTM A153), mechanically galvanized (ASTM B695 class 55 minimum), stainless steel (type 303, 304, 305, or 316), silicon bronze, or copper by approved methods for the following applications:
 - a. Exterior, exposed use.
 - b. In contact with preservative or fire-retardant treated wood.
 - c. Nails in contact with preservative treated wood containing ammonia shall be stainless steel.
4. Fasteners in moist corrosive atmosphere to be of stainless steel (type 303, 304, 305, or 316).
5. Where the retention level of ACQ or MCQ preservative is greater than 0.40 pcf, CBA-A preservative is greater than 0.41 pcf, or CA-B preservative is greater than 0.21 pcf, provide stainless steel fasteners (type 303, 304, 305, or 316).
6. All fasteners specified by manufacturer shall be installed in framing hardware, unless noted otherwise.
7. At borate treated lumber a clear zinc coating per ASTM F1941 is acceptable.

B. Nails and nailing not otherwise shown or specified:

1. Comply with requirements of governing building code.
2. For securing materials to hardened concrete or masonry provide hardened steel masonry nails or Simpson Strong-Tie "Titen" screws.
3. For framing and general woodwork: Common bright wire nails (not box nails) with centered full-round heads per ASTM F1667 including Supplement S1. 16d cement coated sinker nails may be used in lieu of common nails for framing, where noted on the drawings. Unless otherwise noted on drawings, nail sizes shall be as follows
 - a. 8d Common: 0.131"Ø x 2-1/2" long with 0.281"Ø head.

- b. 10d Common: 0.148"Ø x 3" long with 0.312"Ø head.
 - c. 16d Common: 0.162"Ø x 3-1/2" long with 0.344"Ø head.
- 4. Nails for sheathing panels shall be of common wire with full round heads and shall be of sufficient length to fully develop the nails.
 - 5. Machine-driven nails of all types must comply with the requirements of this section. All proposed nails shall match diameter and penetration of specified nails.
 - 6. Staples shall conform to length and gauges specified and shall be installed to match specified patterns and spacing.
 - 7. Power Actuated Fasteners (PAF): Use only as approved by the Architect/Engineer; operators shall be qualified.
- C. Bolts: Malleable iron washers or steel plate washers, unless otherwise shown, shall be provided under all bolt heads and nuts.
- 1. Machine Bolts: ASTM A307 and ANSI/ASME B18.2.1, standard semi-finished machine bolts as shown or required. Nuts shall be standard size unless noted otherwise and shall be per ASTM A563.
 - 2. Anchor bolts or threaded rod anchors shall conform to ASTM F1554, ASTM A307, or ASTM A36. Anchor bolts shall be headed or end in two nuts tightened against one another, unless noted otherwise. Provide embedded plate washer as indicated on drawings. No upset threads allowed. No L or J bolts allowed.
- D. Lag screws: Standard hex lag screws per ANSI/ASME B18.2.1.
- E. Wood screws: Standard wood screws per ANSI/ASME B18.6.1.
- F. Power Actuated Fasteners (PAF): Hilti X-CP72, ICC ESR-2379; Simpson PDPAWL-300 MG, ICC ESR-2138.
- G. Framing hardware: Fabricated sheet metal timber framing connectors shall be manufactured from painted or galvanized G90 steel by Simpson Strong-Tie (connectors specified on drawings are per Simpson Strong Tie, USP Lumber Connectors, or approved equivalent. Connectors shall be at least 16 gauge material, (1/8 inch plate materials where welded), unless otherwise noted, punched for nailing. All heavy hardware to be fabricated from A36 steel per Division 05, Metals. All hardware intended for exterior exposed use shall be galvanized per G185 ASTM A653 or stainless steel.
- 1. For contact with preservative or fire-retardant treated wood, provide minimum G185 galvanizing per ASTM A653.

2. Nails and nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. Nails to be used with framing accessories are subject to the requirements specified in this Section for fasteners and anchors.
- H. Subfloor Glue: Water proof, water base, air cure type, cartridge dispensed conforming to APA Standard AFG-01 or ASTM D3498. Maximum Volatile Organic Compound (VOC) shall meet local air quality standards and the California Green Building Code.

2.06 SOURCE QUALITY CONTROL

- A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform testing for moisture content of all lumber at time of fastener installation.
- B. The Testing Agency will submit reports as specified in Division 01.

PART 3 EXECUTION

3.01 REQUIREMENTS FOR STRUCTURAL FRAMING

- A. General
 1. Refer to drawings for layouts, notes and details, provide framing as required; comply with governing building code requirements.
 2. Provide framing to achieve true alignments as surfaces receiving finish materials.
 3. It shall be the responsibility of the Contractor to provide and install all wood blocking, furring strips, or grounds detailed or required to provide anchorage for all finishes, accessories, fixtures, etc. as required to complete all work. All blocking and/or backing shall be securely bolted or otherwise anchored in place.
 4. Contractor shall be responsible for layout of anchor bolts, and other hardware embedded in concrete when placed by other trades.
 5. Provide and install all structural framing, blocking, fasteners, brackets, clips, etc. as required to complete work specified in the Construction Documents.
- B. Framing
 1. Sill Plates and Ledgers:
 - a. Sill plates and ledgers on concrete shall be anchored with bolts, unless noted otherwise, shall have full bearing on concrete, and shall be placed for sheathing panel nailing as indicated. All bolt nuts shall be provided with a cut plate steel washer for bearing on wood.

- b. Provide a minimum of two sill anchor bolts per sill piece with a bolt no less than 4 ½" and no more than 12" from the end of the sill. Bolts to be 5/8" diameter x 12" (18" at curb) long at 48" on centers, unless otherwise shown or noted. Provide additional anchor bolts each side of a notch or hole, as per a typical plate splice, where notch or hole is in excess of 1/3 the plate width. At shear walls, provide a plate washer 3" x 3" x 0.229" minimum between the sill and nut at anchor bolts. Plate washer to extend within ½ inch of the structural wall sheathing. Offset and/or stagger anchor bolts, or provide larger plate washer as required.
 - c. Anchor bolt holes in sill plates or ledgers shall be 1/16" maximum larger than anchor bolt.
2. Stud Walls and Framing:
- a. Cut studs and posts with square ends, unless otherwise shown or noted. All posts and beams shall be "cut to bear" unless otherwise detailed.
 - b. All studs in walls shall be placed with the shortest dimension parallel to the run of the wall. Bearing studs shall extend full height to be the supporting framing as shown; non-bearing studs shall extend to the supporting framing.
 - c. Provide double studs on each side of all openings, unless shown or noted otherwise.
 - d. All openings in stud walls and partitions shall be framed with headers across the top, as shown, with a minimum size (6" nominal depth x stud width) resting on short cripple studs, and as shown on the drawings.
 - e. All stud partitions and walls shall have horizontal solid blocking not less than 2x and of the same width as the stud, fitted and nailed into the studs at mid-height of stud, for studs over 8 feet in height, except as otherwise shown or specified. This blocking shall be so spaced that there shall be no concealed air spaces greater than eight feet in any dimension.
 - f. Stud partitions containing plumbing, heating or other pipes shall be so framed as to give proper clearance for piping. Plumbing, heating and vent pipes exceeding 1-1/2" in inside diameter shall not be placed in partitions used as bearing or shear walls unless completely furred clear of the wall. No notching shall be allowed. Pipes shall be placed in the center of the plate using a neat bored hole and the plates shall be strapped on each side with 3" x 36" x 14 gauge steel punched for 10d nails 3" on center, staggered, or as shown on the drawings.
3. Top Plates
- a. Top plates shall be double, set single. Corners where stud wall or partitions meet shall be framed with studs on all surfaces and blocking to form a "rigid" corner

with nailing for all corners. Double top plates shall be lapped at corners. Lap splices and nailing per the drawings.

4. Floor, Roof and Ceiling Framing

- a. Joists and beams shall be accurately aligned and the position and spacing of all joists and beams shall be as shown and be coordinated with other framing and to other trades prior to actual construction.
- b. Place all joists and beams with crown up. Cantilevered joists and beams shall be placed with the crown down.
- c. Cutting of wood girders, beams or joists for electrical and mechanical lines shall be limited to cuts and bored holes not deeper than 1/5 of the beam depth from the top and located not farther from the support than three times the beam depth and not less than the beam depth. Cuts in excess of this, or single bored holes with a diameter of more than 1" are not permitted without special provisions for framing the beams. Location of all cuts in framing shall receive the prior review of the Architect/Engineer.
- d. Provide vent holes in rafters and/or blocking as shown and/or directed by the Architect.

3.02 STRUCTURAL SHEATHING

A. General

1. Sheathing nailing shall be as required on the drawings. Do not overdrive (Do not break skin of sheathing face sheet). Over driving will be cause for rejection.
2. Form sheathing may be re-used for concealed sheathing provided the lumber at the time of re-use is approved by the Architect, meets with the framing grade requirements specified herein, is in good condition, and is thoroughly cleaned with all nails removed.
3. Pneumatic nailing devices shall be adjustable so that nail heads do not penetrate skin of sheathing. Contractor shall submit equipment and nails for review prior to use. Refer to PART 2 for other nailing requirements.

B. Roof and Floor Sheathing: Except "Panelized Roofs", lay with face grain perpendicular to roof rafters, roof trusses or floor joists. Stagger sheets. Block all unsupported sheet edges with 2x material unless noted otherwise.

C. Wall Sheathing: Lay with face grain either parallel or perpendicular to studs. Exposed bottom edges shall be sealed as recommended by manufacturer. Block all unsupported sheet edges with 2x materials unless noted otherwise.

- D. Panelized Roofs: Where sheathing is set @ 8'-0 1/8" spacing, cut every fourth sheet short by 1/2" to re-align structural framing that has been specified to be spaced at even units of 2, 4 or 8 feet.

3.03 ROUGH HARDWARE

- A. General: Nails, spikes, screws, fabricated sheet metal anchors, ties, hangers and any other materials shown or required for the attachment of wood to concrete and wood to steel and wood to wood shall be furnished and installed as part of this work.
- B. Framing Nailing: All framing nailing shall conform to minimum requirements of the Building Code, and with details shown on the drawing.
- C. Bolts, Lag Screws and Washers:
1. Bolts in wood shall be machine bolts unless otherwise noted and shall be of such length that the bearing length of the threads does not exceed ¼ of the full bearing length in the member holding the threads. Bolt holes in wood shall be 1/32" oversized. Bolt holes for sill plates may be 1/16" maximum oversize. Holes in steel shall be 1/16" oversize. See Section 3.1 for anchor bolts at sill plates and ledgers.
 2. Provide square plate or malleable iron washer and nut at head where bearing is against wood; cut washer under nut where it is against steel. Washer will not be required under head of carriage bolts. Provide malleable iron washers where exposed.
 3. All nuts shall be tightened when placed and retightened at completion of the job or immediately before closing with final construction.
 4. Lag screws shall be screwed (not driven) into place. Drill pilot hole to 70% of shank diameter. Drill clearance hole to full shank diameter and depth of unthreaded screw length.
- D. Wood Screws: Minimum penetration is 10 diameters unless noted otherwise. Where fastening hardwood timber species or where wood tends to split, provide pilot hole 70% of screw shank diameter.
- E. Proprietary Fasteners and Hardware: Install per manufacturer's published installation instructions (MPII) and code approval report (e.g. ICC ESR, IAPMO ER, etc). Provide MAX quantity, size, and length of fastener at hardware (i.e. joist hangers, framing, clips, etc) unless otherwise noted per plan.

3.04 INSTALLATION OF ACCESSORIES AND MISCELLANEOUS WOOD

- A. Coordinate installation of wood decking, metal-web wood joists, glued-laminated wood construction, shop-fabricated wood trusses, and wood I- joists.

- B. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members. Fasten curbs corner-to-corner and to rafters with framing connectors configured for this application.
- C. Blocking:
1. Provide fire blocking at locations and spacing's as required by CBC Chapter 7. Locate other blocking, supplementary framing, backing plates and bracing to facilitate installation of finish materials, fixtures, equipment, services, accessories, and trim requiring attachment and support.
 2. Solid block joists and rafters over all supports with blocking of the same size and material as the joist or rafter.
- D. Furring:
1. Nominal 1 inch x 3 inch minimum, continuous and spaced at 16 inches on center, maximum.
 2. Install plumb, rigid, and level. Shim where necessary to provide a true, even plane suitable to receive the finish required.
 3. Attach to concrete and masonry as shown in the contract drawings.
- E. Bridging: Use 2 inch solid cross bridging. Nail bottom ends of bridging only after sheathing has been nailed.
- F. Stair Framing: Provide with 3 stair stringers for each set of stairs, unless otherwise shown. Cut notches to receive exact size of treads and risers (if any) shown, with no change in dimensions between landings. Provide stringers of size shown, or if not shown, of a size to allow not less than 3-1/2 inch of effective depth, measured perpendicular to the rake of the stringer, after notching.
- G. Install miscellaneous metal angles, bolts, and other items; secure into formwork where embedded in concrete.
- H. Install accessory items not otherwise set under other sections; after completion of painting and other finishing work; in locations shown or directed by the Architect. Set items plumb, level, and secure using appropriate fastening as applicable.

3.05 FIELD APPLIED WOOD TREATMENT

- A. Field treat all end cuts and holes in preservative treated materials per PART 2.
- B. Apply two brush coats; or full-immersion dip not less than 15 minutes; or as required to thoroughly saturate all surfaces after cutting.

- C. Air dry 2-hours minimum before installation.

3.06 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane (Other than Floors): 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum. Provide framed substrates meeting requirements for application of finishes specified in other sections.
- D. Exposed surfaces shall be free from dents and tool marks, unsanded rough or torn faces and corners, and other defects.

3.07 FIELD QUALITY CONTROL

- A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform the following tests and submit reports as specified in Division 01:
 - 1. Moisture content of all lumber at time of close-in.
 - 2. Periodic special inspection of nailing, bolting, and other fastening within the seismic-force-resisting system including shear walls, wood diaphragms, etc. per CBC Section 1705.13.2, excluding systems with sheathing nailing spacing greater than 4" on center.
 - 3. Special inspection of high load diaphragms per CBC Section 1705.5.1 where designated on documents.

3.08 ADJUSTING

- A. Replace all defective work at Contractor's expense.
- B. Replace defective or damaged work with conforming work.
- C. Correct defects using means that will not injure the materials.
- D. Replace defective or damaged work which cannot be corrected in the field with new work, or return defective items to the shop for repair.
- E. Repair or replace framing lumber sagged, twisted or warped due to shrinkage from excessive moisture content at time of installation, or from other causes.
- F. Adjust to meet specified tolerances.
- G. Architect/Engineer shall review all proposals for the repair or replacement of damaged, defective, or missing work.

- H. Pay expenses incurred by Owner for Architect/Engineer's costs for (re-)design and obtaining approvals of Authorities Having Jurisdiction (AHJ) necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work.
- I. Pay expenses due to re-testing and re-inspection necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work.

3.09 CLEANING AND PROTECTION

- A. Clean all surfaces upon completion of erection, leave free of grime and dirt. Remove unused materials, tools, equipment, and debris from the premises and leave surfaces broomed clean.
- B. Waste Disposal: Comply with the requirements of pertinent sections of Division 01 specifying cleaning and disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- C. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- D. Prevent sawdust and wood shavings from entering the storm drainage system.
- E. Protect work from damage by subsequent operations.

END OF SECTION

SECTION 06 20 00 - FINISH CARPENTRY**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Interior Finish Carpentry
- B. Wood casings and moldings.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Requirements for certified wood and low-emitting materials.
- C. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- D. Section 06 41 00 - Architectural Wood Casework : Shop fabricated custom cabinet work and plastic laminate tops..
- E. Section 08 14 16 - Flush Wood Doors.
- F. Section 08 80 00 - Glazing
- G. Section 09 90 00 - Painting and Coating: Field finishing of finish carpentry items.
- H. Section 12 36 00 - Countertops: Solid surfacing.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
- C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- F. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- G. AWPA U1 - Use Category System: User Specification for Treated Wood; 2022.

- H. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.
- I. WI (CCP) - Certified Compliance Program (CCP); Current Edition.
- J. WI (CSIP) - Certified Seismic Installation Program (CSIP); Current Edition.

1.04 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
 - 2. Product Data for CALGreen 5.504.4.3 – Finish Material Pollutant Control; Architectural paints and coatings, including printed statement of VOC content and chemical components.
 - 3. Product Data for CALGreen 5.504.4.5 – Composite Wood Products: For composite-wood products, showing requirements for formaldehyde as specified in Table 5.504.4.
 - 4. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for certified wood and low-emitting materials.
- B. Product Data:
 - 1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.
 - 2. Provide data on fire retardant treatment materials and application instructions.
 - 3. Provide instructions for attachment hardware and finish hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 - 2. Include certification program label.
- D. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- E. Manufacturer's Instructions: Provide manufacturer's installation instructions for factory-fabricated units.

1.05 QUALITY ASSURANCE

- A. Forest Stewardship Council (FSC) Certified Products:
 - 1. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

2. Forest Certification: Provide components made with not less than 50 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- C. Quality Certification:
1. Comply with WI (CCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section www.woodworkinstitute.com/#sle.
- D. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
1. Provide designated labels on shop drawings as required by certification program.
 2. Provide designated labels on installed products as required by certification program.
 3. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated units to project site in original packages, containers or bundles bearing brand name and identification.
- B. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.
- C. Protect from moisture damage.
- D. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Adhesives and Sealants; Architectural Paints and Coatings including aerosol paint and coating systems; and low-emitting materials, including Composite Wood Products.
- B. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- C. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

D. Interior Woodwork Items:

1. Moldings, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.
2. Miscellaneous Trim for Transparent Finish: white oak; prepare for transparent finish.
3. Miscellaneous Trim for Opaque Finish: redwood, prepare for paint finish

2.02 SUSTAINABILITY CHARACTERISTICS

- A. Provide sustainably harvested wood, certified or labeled; see Section 01 81 13 - Sustainable Design Requirements.
- B. Provide composite wood products complying with composite wood indoor emission requirements in Section 01 81 13 - Sustainable Design Requirements.

2.03 LUMBER MATERIALS

- A. Softwood Lumber: redwood or matching existing species, B Heart, flat sawn sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
- B. Hardwood Lumber: oak or matching existing species, rift or match existing adjacent sawn, maximum moisture content of 6 percent ; with vertical grain , of quality suitable for transparent finish.

2.04 SHEET MATERIALS

- A. Hardwood Plywood: Face species _____, plain sawn, book matched, medium density fiberboard core; HPVA HP-1 Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

2.05 FASTENINGS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials.
- B. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- C. Adhesive for factory-fabricated units: Manufacturer's recommended adhesive for application.
- D. Fasteners: Of size and type to suit application; matching finish in concealed locations and matching finish in exposed locations.
- E. Fasteners for Exterior Applications: Stainless steel; length required to penetrate wood substrate 1-1/2 inch minimum.
- F. Concealed Joint Fasteners: Threaded steel.

2.06 ACCESSORIES

- A. Lumber for Shimming and Blocking: Softwood lumber of indicated species.
- B. Slatwall Hardware:
 - 1. Slatwall Inserts: 8'-0" long aluminum slatwall inserts for custom installation as indicated, and ready to accept slatwall hangers and display units.
 - 2. Product: Discount Shelving and Displays, Inc. "Item No. SWM18" or equal.
 - 3. Finishes: Manufacturer's silver or black color, as selected by Architect.
- C. Picture Rail: Fry Reglet Model No. DRMH-50, or equal; clear anodized aluminum.
- D. Miscellaneous Aluminum Trim Profiles: As indicated on drawing details. Fry Reglet, or equal; clear anodized aluminum.
- E. Glass: See Section 08 80 00 - Glazing.
 - 1. Safety Glass: ASTM C1048, fully tempered; clear; 1/8 inch thick, minimum.
 - 2. Safety Glass: Laminated glass complying with 16 CFR 1201 and ANSI Z97.1; clear; nominally 6 mm thick.
- F. Primer: For factory-primed units, manufacturer's recommended primer, conforming to specified VOC limits.
- G. Wood Filler: Oil base, tinted to match surface finish color.

2.07 WOOD TREATMENT

- A. Factory-Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Wood Preservative by Pressure Treatment (PT Type): Provide AWPA U1 treatment using waterborne preservative with 0.25 percent retainage.
- C. Provide identification on fire retardant treated material.
- D. Redry wood after pressure treatment to maximum ____ percent moisture content.

2.08 SITE FINISHING MATERIALS

- A. Field Finishing: As specified in Section 09 90 00 - Painting and Coating.

2.09 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Shop prepare and identify components for book match grain matching during site erection.

- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.10 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Stain: As selected by Architect.
 - c. Sheen: Flat.
 - 2. Opaque:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Color: As selected by Architect.
 - c. Sheen: Flat.
- E. Back prime woodwork items to be field finished, prior to installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Install factory-fabricated units in accordance with manufacturer's printed installation instructions.
- C. Set and secure materials and components in place, plumb and level.

- D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.04 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 90 00 - Painting and Coating.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

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SECTION 06 41 00 - ARCHITECTURAL WOOD CASEWORK**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.
- C. Factory finishing.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Requirements for certified wood and low-emitting materials.
- C. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- D. Section 09 90 00 - Painting and Coating: Field finishing of exposed cabinet surfaces not indicated to receive shop finish.
- E. Section 12 36 00 - Countertops.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. BHMA A156.9 - Cabinet Hardware; 2020.
- D. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- F. WI (CCP) - Certified Compliance Program (CCP); Current Edition.
- G. WI (CSIP) - Certified Seismic Installation Program (CSIP); Current Edition.

1.04 DEFINITIONS

- A. Exposed surfaces include all surfaces visible when:
 - 1. Drawers and opaque doors (if any) are closed.

2. Bottoms of cabinets 42-inches or more above finished floor.
 3. Top of cabinets below 78-inches above finished floor.
- B. Semi-exposed surfaces include the following:
1. Open opaque doors or extended drawers.
 2. Bottoms of cabinets that are more than 30-inches and less than 42-inches above finished floor.
- C. Concealed surfaces include the following:
1. Surfaces not visible after installation.
 2. Bottoms of cabinets less than 30-inches above finished floor.
 3. Tops of cabinets over 78-inches above finish floor and not visible from an upper level.
 4. Stretchers, blocking, and components concealed by drawers.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.
- B. 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.

1.06 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
 2. Product Data for CALGreen 5.504.4.3 – Finish Material Pollutant Control; Architectural paints and coatings, including printed statement of VOC content and chemical components.
 3. Product Data for CALGreen 5.504.4.5 – Composite Wood Products: For composite-wood products, showing requirements for formaldehyde as specified in Table 5.504.4.
 4. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for certified wood and low-emitting materials.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.

2. Show details full size.
 3. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 4. Include certification program label.
 5. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- C. Product Data: Provide data for hardware accessories.
- D. Samples:
1. Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
 2. Veneer-faced panel products with or for transparent finish, 12 by 24 inches (300 by 600 mm), for each species and cut. Include at least one face-veneer seam and edge condition, finished as specified.
 3. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
 4. Thermoset decorative-panels, 8 by 10 inches, for each type, color, pattern, and surface finish, with edge banding on 1 edge.
- E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- F. Sustainable Design Submittal: Documentation for sustainably harvested wood-based components.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 2. Single Source Responsibility: Provide and install this work from single fabricator.
- B. Quality Certification:
1. Comply with WI (CCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section:
<https://woodworkinstitute.com/#sle>.
 2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.

3. Provide designated labels on shop drawings as required by certification program.
 4. Provide designated labels on installed products as required by certification program.
 5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
 6. Replace, repair, or rework all work for which certification is refused.
- C. Forest Stewardship Council (FSC) Certified Products:
1. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
 2. Forest Certification: Provide components made with not less than 50 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.
- B. 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 this Section.

1.09 FIELD 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.
- C. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.10 FIELD MEASUREMENTS

- A. All casework dimensions shall be field verified prior to fabrication.

PART 2 PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Provide materials that comply with requirements of NAAWS's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

- B. Single Source Responsibility: Provide and install this work from single fabricator.

2.02 CABINETS

- A. Quality Standard: Premium Grade for Wood Veneer Cabinets; Custom grade for Plastic Laminate Cabinet, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Wood Veneer Faced Cabinet: Location: Children's bench and Wine Library
1. Exposed Surfaces: HPVA HP-1 Grade A, White Oak, rift cut and comb grain, book-matched. transparent finish
 - a. Grain Direction: Vertically for drawer fronts, doors and fixed panels
 - b. Matching Veneer Leaves: Book match
 - c. Veneer Matching within Panel Face: Balance match
 2. Semi-Exposed Surfaces: HPVA HP-1 Grade B, White Oak, plain sliced, random-matched.
 - a. Surfaces other than drawer bodies: Same species, cut, and finish indicated for exposed surface
 - b. Drawer Sides and Backs: Solid hardwood lumber
 - c. Drawer Bottoms: Thermoset decorative panels
 3. Concealed Surfaces: Manufacturer's option.
 4. Casework Construction Type: Flush overlay
- C. Plastic Laminate Faced Cabinets: Location: Breakroom
1. Cabinet doors indicated to receive glazing or other infill panels shall be constructed as stile and rail units with solid lumber frame. Frames fabricated from MDF substrate material are not acceptable.
- D. Cabinets at Breakroom:
1. Finish - Exposed Exterior Surfaces: Decorative laminate. Wilsonart; Castle Oak
 2. Finish - Exposed Interior Surfaces: Decorative laminate. Wilsonart; Castle Oak
 3. Finish - Semi-Exposed Surfaces: Decorative laminate Wilsonart; Castle Oak
 4. Finish - Concealed Surfaces: Manufacturer's option.
 5. Casework Construction Type: Type A - Frameless.
 6. Interface Style for Cabinet and Door: flush overlay.

7. Layout for Cabinet and Door Fronts: Flush panel.
 - a. Custom Grade: Doors, drawer fronts and false fronts wood grain patterns to run and match vertically within each cabinet unit.
 8. Adjustable Shelf Loading: 40 psf.
 - a. Deflection: L/144.
 9. Cabinet Style: Flush overlay.
 10. Cabinet Doors and Drawer Fronts: As indicated.
 11. Drawer Side Construction: Multiple-dovetailed.
 12. Drawer Construction Technique: Dovetail joints.
- E. Wood Benches with Drawers and Upholstered Cushions for Wood Benches:
1. Exposed Surfaces: HPVA HP-1Grade A, White Oak, rift cut and comb grain, book-matched. transparent finish
 2. Grade: Premium
 3. Upholstered Cushions:
 - a. Dimensions: As indicated
 - b. Construction: Provide fabric wrapped piping on top and bottom edges, zippers to facilitate removal of covers for cleaning, and means of securing cushions to wood benches.

2.03 WOOD-BASED COMPONENTS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements : Requirements for requirements for low-emitting materials, Adhesives and Sealants.
- B. Refer to Section 01 81 13 - Sustainable Design Requirements : Requirements for requirements for low-emitting materials, Composite Wood Products.
- C. Certified Wood: Wood shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-00 and FSC STD-40-004.
- D. Wood fabricated from old growth timber is not permitted.
- E. Provide sustainably harvested wood, certified or labeled; see Section 01 81 13 - Sustainable Design Requirements.
- F. Hardwood and Softwood Lumber: Custom graded in accordance with NAAWS; average moisture content of 8 percent.
 1. Species: Any closed-grain hardwood. For use at concealed areas only.

G. Cabinet Substrate, Shelves: MDF: ANSI A208.2, Grade mr-50, made with binder containing no urea-formaldehyde resin; 3/4-inch Medite II, interior grade woodbased composite panels manufactured from softwood fibers with minimum 90% preconsumer recycled wood combined with formaldehyde-free synthetic resin, with clear sealer.

1. Acceptable Products: Roseburg's "Medite II" and Weyerhaeuser's "Super-Refined MDF2".

2.04 LAMINATE MATERIALS

A. Manufacturers:

1. Basis-of-Design Product: Wilsonart; Color: Castle Oak; Finish: Fine Velvet

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

C. Provide specific types as indicated.

1. Horizontal and Vertical Surfaces: HGS, 0.048 inch nominal thickness, color as selected, finish as selected.
2. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, white color, satin finish.
3. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.05 COUNTERTOPS

A. Countertops: See Section 12 36 00 - Countertops.

2.06 ACCESSORIES

A. Adhesive: FS MMM-A-130 contact adhesive; type recommended by laminate manufacturer to suit application. Comply with requirements of Section 01 81 13 - Sustainable Design Requirements for low-emitting materials.

B. Wood Veneer Edge Banding: Edgebanding on exposed edges shall be compatible for color and grain with exposed surfaces. Min. of 0.5 mm thick to match exposed exterior surface. Veneer tape edgebanding thicker than 1 mm shall be radiused or beveled on edges and corners.

C. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness.

1. Color: As selected by Architect from manufacturer's standard range.
2. Use at all exposed plywood edges.
3. Use at all exposed shelf edges.

- D. Glass: Type laminated as specified in Section 08 80 00 - Glazing.
- E. Fasteners: Size and type to suit application.
- F. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- G. Concealed Joint Fasteners: Threaded steel.
- H. Grommets: Standard plastic or rubber grommets for cut-outs, in color to match adjacent surface.

2.07 HARDWARE

- A. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
- C. Americans with Disabilities Act (ADA)-Compliant Lavatory Cabinet Door Toekick Brackets:
 - 1. Product: 18 gauge steel. 12 inch long prefinished, "Z" profile, prepunched with slotted holes permitting adjustment to floor surface and cabinet clearance conditions. Brackets shall be designed to securely attach toe kick to cabinet door.
 - 2. Finish: Manufacturer's standard, factory-applied powder coat.
 - 3. Color: Selected by Architect from manufacturer's standard range.
 - 4. Manufacturer:
 - a. ADA Toekick; <http://www.adatoekick.com>.
- D. Americans with Disabilities Act (ADA)-Compliant Lavatory Modesty Panel Brackets:
 - 1. Product: 18 gauge steel. 2-part prefinished mounting bracket and plate. Interlocking formed tabs shall permit removal and reinstallation of cabinet modesty panel without use of tools.
 - 2. Cabinet mounting bracket: Prepunched angle receiver (2 per panel)
 - 3. Panel mounting plate: Prepunched and formed plate for back-side attachment to removable modesty panel (2 per panel)
 - 4. Finish: Manufacturer's standard, factory-applied powder coat.
 - 5. Color: White.
 - 6. Manufacturer:

- a. ADA Toekick; <http://www.adatoekick.com>. ; ADA Sink Modesty Panel Bracket
- E. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.
- F. Cabinet Locks at all doors and drawers: Keyed cylinder, two keys per lock, keyed alike in each room, master keyed, steel with chrome finish.
- G. Drawer Slides:
 - 1. Type: Full extension.
 - 2. Static Load Capacity: Extra Heavy Duty grade.
 - 3. Mounting: Bottom mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed type.
 - 6. Manufacturers:
 - a. Accuride International, Inc; Heavy-Duty Drawer Slides: www.accuride.com/#sle.
 - b. Grass America Inc: www.grassusa.com/#sle.
 - c. Knappe & Vogt Manufacturing Company; Heavy-Duty Drawer Slides: www.knapeandvogt.com/#sle.
- H. Hinges: European style concealed self-closing type, steel with nickel-plated finish.
 - 1. Manufacturers:
 - a. Grass America Inc: www.grassusa.com/#sle.
 - b. Hettich America, LP: www.hettich.com/#sle.
- I. Casters: 3-1/8" inch high, plastic, two-wheel swivel casters with brake and mounting plate.
 - 1. Product: Doug Mockett & Co., Inc.'s Model CA42PA "Small Twin-Wheel Caster" or equal
 - 2. Finishes: As selected by the Architect from manufacturer's full range.

2.08 FABRICATION

- A. 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.
- B. Fabricate woodwork to dimensions, profiles, and details indicated.
- C. Complete fabrication, including assembly, finishing, 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.

- 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.
 - 1. Seal edges of openings in countertops with a coat of varnish.
- E. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- F. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- G. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- H. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises.
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Cap exposed plastic laminate finish edges with plastic trim.

2.09 SHOP FINISHING

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Architectural Paints and Coatings including aerosol paint and coating systems.
- B. Sand work smooth and set exposed nails and screws.
- C. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.
- D. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- E. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 5, Varnish, Conversion.
 - b. Stain: As selected by Architect.
 - c. Sheen: Satin.

d. Products:

- 1) Sherwin-Williams Sher-Wood F3 Hi-Bild Precat Lacquer, Transparent, AWI Finishing System 2: www.sherwin-williams.com/#sle.
- 2) Sherwin-Williams Sher-Wood F3 Kemvar Conversion Varnish, AWI Finishing System 5: www.sherwin-williams.com/#sle.
- 3) Sherwin-Williams Sayerlack Hydroplus Waterborne Clear, AF71 Series, ASI Finishing System 8: www.sherwin-williams.com/#sle.
- 4) Sherwin-Williams Sayerlack Premium Polyurethane Clear Topcoat, TZL71 Series, AWI Finishing System 11: www.sherwin-williams.com/#sle.
- 5) Sherwin-Williams Ultra-Cure Waterborne UV Topcoat, Clear, AWI Finishing System 10: www.sherwin-williams.com/#sle.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Verify adequacy of backing and support framing.
- C. Verify location and sizes of utility rough-in associated with work of this section. Verify that mechanical, electrical, plumbing and other building items are in place, complete and ready to receive the work of this Section.
- D. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing material and backpriming.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. 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.
- F. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose. Refinish cut surfaces, and repair damaged finish at cuts.
- G. Secure cabinets to floor using appropriate angles and anchorages.

1. 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.
- H. Secure and anchor countertops specified in other Sections.

3.03 ADJUSTING

- A. Test installed work for rigidity and ability to support loads.
- B. Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 2. Adjust joinery for uniform appearance.
- C. Provide seismic anchorage for casework in accordance with drawing details.
- D. Adjust moving or operating parts to function smoothly and correctly.
- E. Repair damaged and defective casework, where possible, to eliminate functional and visual defects; where not possible to repair, replace casework.

3.04 PROTECTION AND CLEANING

- A. Protect casework after installation; do not allow other trades to use countertops as footstools or ladders to perform their work.
- B. Prior to Final Completion, remove and dispose of protective coverings. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 06 83 16 - FIBERGLASS REINFORCED PANELING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fiberglass reinforced plastic panels.
- B. Trim.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements for low-emitting materials.

1.03 REFERENCE STANDARDS

- A. 9 CFR 416.2 - Regulatory Requirements Under the Federal Meat Inspection Act and the Poultry Products Inspection Act, Part 416-Sanitation; current edition.
- B. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- C. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2022.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

1.04 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Samples: Submit two samples 6 inch by 6 inch in size illustrating material and surface design of panels.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fiberglass Reinforced Plastic Panels:
 - 1. Marlite, Inc: www.marlite.com/#sle.
 - 2. Nudo Products, Inc: www.nudo.com/#sle.
 - 3. Panolam Industries International, Inc; _____: www.panolam.com/#sle.

2.02 PANEL SYSTEMS

- A. Wall Panels Standard FRP:
 - 1. Panel Size: 4 by 8 feet.
 - 2. Panel Thickness: 0.09 inch.
 - 3. Surface Design: Pebbled.
 - 4. Color: 100 White.
 - 5. Attachment Method: Adhesive only, with trim and sealant in joints.

2.03 MATERIALS

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
 - 1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Sanitation and Cleanability: Comply with 9 CFR 416.2.
- B. Trim, Corner Guards, Base Moldings: PVC; color coordinating with panel.
- C. Fasteners: As recommended by manufacturer .
- D. Adhesive: Type recommended by panel manufacturer.
- E. Sealant: Type recommended by panel manufacturer; color matching panel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Pre-drill fastener holes in panels, 1/8 inch greater in diameter than fastener, spaced as indicated by panel manufacturer.
- D. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- E. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- F. Install panels with manufacturer's recommended gap for panel field and corner joints.
- G. Drive fasteners to provide snug fit, and do not over-tighten.
- H. Place trim on panel before fastening edges, as required.
- I. Fill channels in trim with sealant before attaching to panel.
- J. Install trim with adhesive and screws or nails, as required.
- K. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- L. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

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SECTION 07 21 00 - THERMAL INSULATION**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Batt insulation in exterior wall construction.
- B. Batt insulation in interior partition construction
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.

1.03 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- C. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C; 2022.

1.04 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
 - 2. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

- E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

1.05 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Evaluated Materials Program (EAP); www.airbarrier.org/#sle: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.06 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation in Wood Framed Walls: Batt insulation with integral vapor retarder.

2.02 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
 - 1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 4. Formaldehyde Content: Zero.
 - 5. Thermal Resistance: R-value of 21.
 - 6. Facing: Aluminum foil, flame spread 25 rated; one side.
 - 7. Products:
 - a. CertainTeed Corporation; _____: www.certainteed.com/#sle.
 - b. Johns Manville; _____: www.jm.com/#sle.
 - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com/#sle.
 - d. Owens Corning Corporation; Sound Attenuation Batt Insulation

2.03 ACCESSORIES

- A. Flashing Tape: Special reinforced film with high performance adhesive.
 - 1. Application: Window and door opening flashing tape.
 - 2. Width: As required for application.
 - 3. Primer: Tape manufacturer's recommended product.
 - 4. Products:
 - a. Protecto Wrap Company; Protecto Super Stick Building Tape: www.protectowrap.com/#sle.
 - b. Protecto Wrap Company; Protecto Seal 45 Butyl: www.protectowrap.com/#sle.
 - c. Protecto Wrap Company; Protecto Seal PW 100/40: www.protectowrap.com/#sle.
 - d. Protecto Wrap Company; Protecto BT20XL Butyl: www.protectowrap.com/#sle.
 - e. Protecto Wrap Company; Protecto BT25XL: www.protectowrap.com/#sle.
- B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
 - 1. Products:
- C. Insulation Fasteners: Lengths of unfinished, 13 gauge, 0.072 inch high carbon spring steel with chisel or mitered tips, held in place by tension, length to suit insulation thickness and substrate, capable of securely supporting insulation in place.
- D. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, or irregularities.

3.02 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

- E. Install with factory-applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
- F. Staple or nail facing flanges in place at maximum 6 inches on center.
- G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- H. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over face of member.
- I. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over face of member
- J. Tape seal tears or cuts in vapor retarder.
- K. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

3.03 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 25 00 - WEATHER BARRIERS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Water-resistive barriers.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 06 10 00 - Rough Carpentry: Water-resistive barrier under exterior cladding.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

1.03 DEFINITIONS

- A. Weather Barriers: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Water-Resistive Barrier: A material behind an exterior wall covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly.

1.04 REFERENCE STANDARDS

- A. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).
- B. ASTM D779 - Standard Test Method for Determining the Water Vapor Resistance of Sheet Materials in Contact with Liquid Water by the Dry Indicator Method; 2016.
- C. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
- E. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers; 2016, with Editorial Revision (2019).

1.05 SUBMITTALS

- A. Product Data: Provide data on material characteristics.
- B. Shop Drawings: Provide drawings of special joint conditions.

- C. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.01 WATER-RESISTIVE BARRIER MATERIALS

- A. Asphalt Felt: ASTM D226/D226M, Type I, No.15 asphalt felt.
- B. Building Paper: Asphalt-saturated kraft Grade D type sheathing paper complying with ICC-ES AC38.
 - 1. Water Resistance: At least 60 minutes when tested in accordance with ASTM D779.
 - 2. Water Vapor Permeance: 29 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.
 - 3. Products:
 - a. Henry Company; Super Jumbo Tex 60 Minute: www.henry.com/#sle.

2.02 ACCESSORIES

- A. Sealants, Tapes, and Accessories Used for Sealing Water-Resistive Barrier and Adjacent Substrates: As indicated or complying with water-resistive barrier manufacturer's installation instructions.
- B. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and weather barrier materials. Provide where required by Weather Barrier manufacturer. Product shall be fully compatible with Weather Barrier system.
- C. Primer: Liquid applied polymer. Provide where required by Weather Barrier manufacturer. Product shall be fully compatible with Weather Barrier system.
- D. Liquid applied flashing Used for Sealing at lintel and bolts: As indicated and product to be compatible with Weather Barrier system.
- E. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
 - 1. Width: 4 inches.
 - 2. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 30 days of weather exposure.
 - 3. Products:

- a. DuPont de Nemours, Inc; FlexWrap: www.dupont.com/building/#sle.
 - b. Henry Company; FortiFlash: www.henry.com/#sle.
- F. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
- 1. Width: As required to match wall assemblies.
 - 2. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 30 days of weather exposure.
 - 3. Products:
 - a. Protecto Wrap Company; Triple Guard Energy Sill Sealer: www.protectowrap.com/#sle.
- G. Thinners and Cleaners: As recommended by water-resistive barrier manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions comply with requirements of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Water-Resistive Barriers: Install continuous water-resistive barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.
- C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.
- D. Mechanically Fastened Exterior Sheets:
 - 1. Install sheets shingle-fashion to shed water, with seams aligned horizontal.
 - 2. Overlap seams as recommended by manufacturer, 6 inches, minimum.
 - 3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches, minimum.

4. Attach to framed construction with fasteners extending through sheathing into framing, and space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
 5. Attach to masonry construction using mechanical fasteners spaced at 12 to 18 inches vertically on center, and at 24 inches, maximum, horizontally on center.
 6. For applications indicated to be airtight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners as recommended by manufacturer.
 7. Where stud framing rests on concrete or masonry substrate, extend lower edge of barrier sheets at least 4 inches below bottom of framing and seal to substrate with sealant or approved mounting tape.
 8. Install water-resistive barrier over jamb flashings.
 9. Install head flashings under water-resistive barrier.
 10. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.
- E. Self-Adhered Sheets:
1. Prepare substrate in accordance with sheet manufacturer's installation instructions; fill and tape joints in substrate and between dissimilar materials.
 2. Lap sheets shingle-fashion to shed water and seal laps airtight.
 3. Upon placement of sheets, firmly press onto substrate with resilient hand roller; ensure that laps are firmly adhered with no gaps or fishmouths.
 4. Use same material, or other material approved by sheet manufacturer, to seal sheets to adjacent substrates, and as flashing.
 5. At expansion joints, provide transition to joint assemblies approved by sheet manufacturer.
- F. Openings and Penetrations in Exterior Water-Resistive Barriers:
1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches onto water-resistive barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
 2. At openings filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
 3. At openings filled with nonflanged frames, seal water-resistive barrier to each side of framing at opening using flashing at least 9 inches wide, and covering entire depth of framing.

4. At head of openings, install flashing under water-resistive barrier extending at least 2 inches beyond face of jambs; seal water-resistive barrier to flashing.
5. At interior face of openings, seal gaps between window and door frames and rough framing using appropriate joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating items and seal to surface of water-resistive barrier.

3.04 FIELD QUALITY CONTROL

- A. See Division 01 for additional requirements.
- B. Owner's Inspection and Testing: Cooperate with Owner's testing agency.
 1. Allow access to work areas and staging.
 2. Notify Owner's testing agency in writing of schedule for work of this section to allow sufficient time for testing and inspection.
 3. Do not cover work of this section until testing and inspection is accepted.
- C. Do not cover installed water-resistive barriers until required inspections have been completed.
- D. Obtain approval of installation procedures from water-resistive barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
- E. Take digital photographs of each portion of installation prior to covering up weather barriers.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.
- B. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.

END OF SECTION

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SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings and exterior penetrations.
- B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 74 19 - Construction Waste Management and Disposal.
- C. Section 01 81 13 - Sustainable Design Requirements: Requirements low-emitting materials.
- D. Section 09 90 00 - Painting and Coating: Field painting.

1.03 REFERENCE STANDARDS

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2022.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
- F. CDA A4050 - Copper in Architecture - Handbook; current edition.
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. CALGreen Submittals: Provide the following:

1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
 2. Product Data for CALGreen 5.504.4.3 – Finish Material Pollutant Control; Architectural paints and coatings, including printed statement of VOC content and chemical components.
 3. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples, 6 by 6 inches in size, illustrating metal finish color.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with _____ years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Adhesives and Sealants.
- B. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Architectural Paints and Coatings including aerosol paint and coating systems.

2.02 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, 0.0239 inch thick base metal.

- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, 0.0239 inch thick base metal, shop pre-coated with PVDF coating.
1. Silicone Modified Polyester Coating: Pigmented organic powder coating, AAMA 2603; baked enamel finish system.
 2. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
 3. Color: Match existing adjacent.

2.03 FLASHING UNDERLAYMENT

- A. Sheet Membrane Underlayment at Flashings: Self-adhered, cold-applied composite rubberized asphalt sheet membrane consisting of rubberized asphalt bonded to a cross-laminated high-density polyethylene film with primers and seam sealers as required for a complete watertight installation; provide materials compliant with applicable regulations limiting VOCs.
1. Under Sheet Metal and Flashing: Minimum 40-mil thick, high temperature self-adhering, polymer-modified, bituminous sheet membrane, complying with ASTM D1970/D1970M, manufacturers and types as follows:
 - a. Basis-of-Design Product: The design for the system is based on the manufacturer identified below. Subject to compliance with requirements, provide the named product or a comparable product by the following:
 - b. Basis-of-Design Product: GCP Applied Technologies; Grace Ice and Water Shield HT.
 - c. Ensure named product is compatible with fluid-applied membrane air barrier material for a complete weathertight system.

2.04 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.05 EXTERIOR PENETRATION FLASHING PANELS

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.06 ACCESSORIES

- A. Concealed Sealants: Non-curing butyl sealant.
- B. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
 - 1. Products:
 - a. Franklin International, Inc; Titebond WeatherMaster Metal Roof Sealant: www.titebond.com/#sle.

PART 3 EXECUTION

3.01 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.02 UNDERLAYMENT

- A. 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.

3.03 INSTALLATION

- A. Comply with drawing details.
- B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- C. Apply plastic cement compound between metal flashings and felt flashings.
- D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.

3.04 FIELD QUALITY CONTROL

- A. See Div 01 for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

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SECTION 07 92 00 - JOINT SEALANTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.
- D. Field quality control

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Additional requirements for sealants and primers. Requirements for low-emitting materials.
- C. Section 08 11 13 - Hollow Metal Doors and Frames.
- D. Section 08 43 13 - Aluminum-Framed Storefronts.
- E. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
- F. Section 08 80 00 - Glazing: Glazing sealants and accessories.
- G. Section 09 30 00 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.
- H. Division 23: Duct sealants.
- I. Division 32: Joints in pedestrian and vehicular pavement, curbs and gutters.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).
- B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).
- C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2022.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

- G. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.
- H. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.
- I. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).
- J. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

1.04 ACTION SUBMITTALS

- A. CALGreen Submittals: Provide product data to demonstrate that adhesives, sealants, and caulks, including all system components such as primers, adhesives, and coatings meet the requirements of the following standards:
 - 1. TABLE 5.504.4.1 - ADHESIVE VOC LIMIT; TABLE 5.504.4.2 - SEALANT VOC LIMIT as listed in Section 01 81 13 - Sustainable Design Requirements.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Substrates for which laboratory adhesion and/or compatibility testing is required.
 - 7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
 - 8. Sample product warranty.
 - 9. Certification by manufacturer indicating that product complies with specification requirements.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Drawings or catalog illustrations in sufficient detail to show installation and interface of the work of this Section with the work of adjacent trades.

- E. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.05 INFORMATIONAL SUBMITTALS

- A. Certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds (VOCs).
- B. Submit manufacturer's letter of certification that products comply with specified requirements and are suitable for the uses intended.
- C. Product Test Reports:
 - 1. Certified test results of elastomeric sealants showing compliance with specified requirements. Include results of aged performances including hardness, stain-resistance, adhesion and cohesion under cyclic movement, low temperature flexibility, modulus of elasticity at 100-percent strain, effects of heat and aging, and effects of accelerated weathering.
 - 2. Preconstruction field test results indicating which products and joint preparation methods demonstrated acceptable adhesion to joint substrates.
- D. Installer Qualifications:
 - 1. Written documentation of applicator's qualifications, including reference projects of similar scope and complexity, with current phone contacts of architects and owners for verification.

1.06 CLOSEOUT SUBMITTALS

- A. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation; see Section 01 81 13 - Sustainable Design Requirements.
- B. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
- C. Installation Plan: Submit at least four weeks prior to start of installation.
- D. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
- E. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
- F. Installation Log: Submit filled-out log for each length or instance of sealant installed.
- G. Field Quality Control Log: Submit filled-out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

- H. Manufacturer's qualification statement.
- I. Installer's qualification statement.

1.07 QUALITY ASSURANCE

- A. Single Source Responsibility for Joint Sealants: Obtain joint sealants of each type from a single manufacturer.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company shall be approved by the sealant manufacturer and shall demonstrate at least three years of documented experience in installing materials of types specified.
 - 1. Provide list of at least three projects of similar scope and complexity.
 - 2. Installer shall designate a single individual as project foreman who shall be on site at all times during installation.
- D. Pre-Installation Conference: Prior to scheduled commencement of the sealant installation and associated work, conduct a meeting at the project site with the installer, architect/consultant, owner, manufacturer's representative and any other persons directly involved with the performance of the Work. The Installer shall record conference discussions and to include decisions and agreements reached (or disagreements), and furnish copies of recorded discussions to each attending party. The main purpose of this meeting is to review foreseeable methods and procedures related to the Work.
- E. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Allow sufficient time for testing to avoid delaying the work.
 - 4. Deliver sufficient samples to manufacturer for testing.
 - 5. Submit to joint sealant manufacturer samples of actual materials that will contact or affect their joint sealants in the Work for compatibility and adhesion testing.
 - 6. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 - 7. Testing is not required if sealant manufacturer provides data acceptable to the Architect showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.
- F. Installation Plan: Include schedule of sealed joints, including the following:

1. Joint width indicated in Contract Documents.
 2. Joint depth indicated in Contract Documents; to face of backing material at centerline of joint.
 3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgment that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
 4. Approximate date of installation, for evaluation of thermal movement influence.
 5. Installation Log Form: Include the following data fields, with known information filled out.
 - a. Unique identification of each length or instance of sealant installed.
 - b. Location on project.
 - c. Substrates.
 - d. Sealant used.
 - e. Stated movement capability of sealant.
 - f. Primer to be used, or indicate no primer is used.
 - g. Size and actual backing material used.
 - h. Date of installation.
 - i. Name of installer.
 - j. Actual joint width; provide space to indicate maximum and minimum width.
 - k. Actual joint depth to face of backing material at centerline of joint.
 - l. Air temperature.
- G. Preinstallation Field Adhesion Test Plan: For jobsite field samples prior to general installation, conduct field-tests for adhesion of each type of joint sealant and joint substrates using proposed joint preparation methods recommended by manufacturer.,
1. Include destructive field adhesion testing of one sample of each combination of sealant type and substrate.
 2. Field Adhesion Test Method: Use manufacturer's standard field adhesion test methods and methods proposed for joint preparation to verify proper priming and joint preparation techniques required to obtain optimum adhesion of joint sealants to joint substrate. Evaluate and report results of field adhesion testing.
 3. Propose locations for field-test joints where inconspicuous and obtain Architect's approval prior to proceeding.

4. Field Samples: Joints installed during pre-construction field adhesion testing that are accepted by Architect shall be retained as standard of acceptability and incorporated into Work of that area during general installation. At least one such standard of minimum 5 feet in length shall be established for each type of sealant and substrate.
 5. Destructive testing is not required for interior acrylic latex sealants.
- H. Preinstallation Field Adhesion Test Log: Include the following for each tested sample:
1. Identification of testing agency.
 2. Name(s) of sealant manufacturer's field representatives who will be observing.
 3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
 - a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
 - b. Test date.
 - c. Locations on project.
 - d. Sealant used.
 - e. Stated movement capability of sealant.
 - f. Test method used.
 - g. Date of installation of field sample to be tested.
 - h. Copy of test method documents.
 - i. Age of sealant upon date of testing.
 - j. Test results, modeled after the sample form in the test method document.
 - k. Indicate use of photographic record of test.
- I. Field Adhesion Test Procedures: Use manufacturer's standard field adhesion test methods and methods proposed for joint preparation to verify proper priming and joint preparation techniques required to obtain optimum adhesion of joint sealants to joint substrate. Evaluate and report results of field adhesion testing.
1. Allow sealants to fully cure as recommended by manufacturer before testing.
 2. Have a copy of the test method document available during tests.
 3. Take photographs or make video records of each test, with joint identification provided in the photos/videos; for example, provide small erasable whiteboard positioned next to joint.

4. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 5. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
 6. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
 7. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- J. Nondestructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
1. Record results on Field Quality Control Log.
 2. Repair failed portions of joints.
- K. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
1. Sample: At least 18 inches long.
 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the 1-inch mark is that distance from the substrate, the test has failed.
 3. If either adhesive or cohesive failure occurs before minimum elongation, take necessary measures to correct conditions and retest; record each modification to products or installation procedures.
 4. Record results on Field Quality Control Log.
 5. Repair failed portions of joints.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in the manufacturer's unopened containers with all labels intact and legible at time of use. Handle and store materials in accordance with manufacturer's recommendations with proper precautions to ensure fitness of material when installed.

1.09 WARRANTY

- A. See Section for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do

not cure. Complete forms in Owner's name and register with manufacturer.

- C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.
- D. Exterior Sealants: Furnish a written warranty against leaks or other defects of materials and workmanship. Defects include but are not limited to changes in the structural, physical or chemical properties of the sealant materials that impair function or require abnormal maintenance, changes in surface finish, color or texture, failure in adhesion, weather resistance or durability, failure to prevent entry of water, or failure to comply with specified requirements.
 - 1. This warranty shall not cover formation of cracks or defects in substrate materials adjacent to the seal, joint movement in excess of movement rating of sealant, or physical damage caused by others.
 - 2. Repair or replace defective materials and workmanship during warranty period without expense to Owner, including removal and replacement of other items as required.
 - 3. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.
 - 4. Warranty Period: Ten years from date of Substantial Completion.
- E. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 PRODUCTS

2.01 SUSTAINABLE MATERIAL REQUIREMENTS, GENERAL

- A. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products as specified in subsection 2, below.

- B. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.
- C. Refer to Section 01 81 13 - Sustainable Design Requirements for requirements for low-emitting materials.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 - c. Other joints indicated below.
 - 3. Do not seal the following types of joints:
 - a. Intentional weep holes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 01 81 13 - Sustainable Design Requirements.
- B. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.04 ELASTOMERIC JOINT SEALANTS

- A. Sealant Type A: Low-modulus, non-sag sealant; comply with ASTM C920, Type S or M, Grade NS, Class 25, Class 35, Class +50/-50, Class +100/-50 as applicable.
 - 1. Applications: For **exterior joints in vertical surfaces and non-traffic horizontal surfaces** including, but not limited to, the following:
 - a. Control and expansion joints in cast-in-place concrete.
 - b. Joints between architectural pre-cast concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Butt joints between metal panels.
 - e. Joints between marble and granite.
 - f. Joints between different materials listed above.
 - g. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
 - h. Control and expansion joints in ceiling and overhead surfaces.
 - 2. Single-Component Urethanes and Silyl-Terminated Polymers:
 - a. Sikaflex-1a (13)
 - b. Sikaflex Textured Sealant (40)
 - c. Sikaflex-15 LM (33)
 - d. SikaHyflex 150 LM (18)
 - 3. Multiple-Component Urethanes and Silyl-Terminated Polymers:
 - a. Sikaflex-2c NS EZ mix (63)
 - 4. Single-Component Silicones:
 - a. Sikasil WS 290 (29)
 - b. Sikasil WS 295 (37)

- c. Sika Silbridge 300 (?)
 - d. Sikasil 728NS (21)
 - e. Sikasil N Plus (37)
- B. Sealant Type B: Low-modulus, non-sag sealant; comply with ASTM C920, Type S or M, Grade NS, Class 25, Class 35, Class +50/-50, Class +100/-50 as applicable.
- 1. Applications: For **interior** joints in **vertical surfaces and non-traffic horizontal surfaces** including, but not limited to, the following:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints on exposed interior surfaces of exterior openings.
 - c. Joints on pre-cast beams and planks.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.
 - e. Trim or finish joints subject to movement.
 - 2. Single-Component Urethanes and Silyl-Terminated Polymers:
 - a. Sikaflex-1a (13)
 - b. Sikaflex Textured Sealant (40)
 - c. Sikaflex-15 LM (33)
 - d. SikaHyflex 150LM (18)
 - 3. Multiple-Component Urethanes and Silyl-Terminated Polymers:
 - a. Sikaflex-2c NS EZ mix (63)
 - 4. Single-Component Silicones:
 - a. Sikasil WS-290 (29)
 - b. Sikasil WS-295 (37)
 - c. Sika Silbridge 300 (?)
- C. Sealant Type C: Polyurethane complying with ASTM C920, Type S or M, Grade P, Class 25 or silicone sealant complying with ASTM C920, Type S or M, Grade P or NS, Class 100/50 as applicable.
- 1. Applications: For **exterior and interior** joints in **horizontal and sloped traffic surfaces** including, but not limited to, the following:
 - a. Control expansion and isolation joints in cast-in-place concrete.

- b. Control expansion and isolation joints in structural pre-cast concrete units.
 - c. Joints between architectural pre-cast concrete paving units.
 - d. Tile control and expansion joints.
 - e. Joints between different materials listed above.
2. Single Component Urethane.
 - a. Sikaflex-1c SL (40)
 3. Multiple-Component Urethane.
 - a. Sikaflex-2c SL (38)
 4. Single Component Silicone:
 - a. Sikasil 728 SL (29)
 5. Multiple-Component Silicone:
 - a. Sikasil 728 RCS (30)
- D. Sealant Type E: Single-component or multi-component polyurethane sealant complying United States Department of Agriculture (USDA) guidelines for incidental food contact with the cured sealant; comply with ASTM C920, Type S or M, Grade P or NS, Class 25; select color from listing of those approved.
1. Applications: For **interior joints** in **vertical and horizontal surfaces where incidental food contact** may occur.
 2. Single Component Urethane:
 - a. Sikaflex-1a (13)
 3. Multiple-Component Urethane:
 - a. Sikaflex-2c NS EZ Mix (63)
- E. Sealant Type F: Single-component urethanes and silyl-terminated polymers.
1. Applications: For interior or exterior joints in vertical surfaces between laps in fabrications of sheet metal.
 2. Single Component Urethane; Sikaflex-1a, Sikaflex Textured Sealant, SikaHyflex 150LM.
 - a. Sikaflex-1a (13)
 - b. Sikaflex Textured Sealant (63)
 - c. SikaHyflex 150LM (18)

- F. Sealant Type G: Single-component urethanes and silicones.
1. Applications: For **exterior vertical joints under metal thresholds and saddles or as bedding sealant for sheet metal flashing and frames of metal or wood.**
 2. Single Component Urethane:
 - a. Sikaflex-1a (13)
 - b. Sikaflex Textured Sealant (40)
 3. Single Component Silicone:
 - a. Sikasil WS 295 (37)

2.05 NONSAG JOINT SEALANTS -

- A. Type AA - Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus ____ percent, minimum.
 2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 5. Color: Match adjacent finished surfaces.
 6. Color: To be selected by Architect from manufacturer's standard range.
 7. Cure Type: Single-component, neutral moisture curing.
 8. Service Temperature Range: Minus 20 to 180 degrees F.
 9. Products:
 - a. Dow; DOWSIL 756 SMS Building Sealant: www.dow.com/#sle. (43.8 g/L)
 - b. Dow; DOWSIL 790 Silicone Building Sealant: www.dow.com/#sle. (38.5 g/L)
 - c. Dow; DOWSIL 791 Silicone Weatherproofing Sealant: www.dow.com/#sle. (30 g/L)
 - d. Dow; DOWSIL 795 Silicone Building Sealant: www.dow.com/#sle. (30 g/L)
 - e. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle. (98; GG)
 - f. Pecora Corporation; Pecora 864 NST (Non-Staining Technology): www.pecora.com/#sle. (98; GG)

- g. Sika Corporation; Sikasil WS-290; www.usa.sika.com/#sle. (29)
 - h. Sika Corporation; Sikasil WS-295; www.usa.sika.com/#sle. (37)
 - i. Sika Corporation; Sikasil 728NS; www.usa.sika.com/#sle. (21)
 - j. Tremco Commercial Sealants & Waterproofing; Spectrem 1:
www.tremcosealants.com/#sle. (1, GG)
 - k. Tremco Commercial Sealants & Waterproofing; Spectrem 2:
www.tremcosealants.com/#sle. (42, GG)
 - l. Tremco Commercial Sealants & Waterproofing; Spectrem 3:
www.tremcosealants.com/#sle. (18, GG)
 - m. Tremco Commercial Sealants & Waterproofing; Spectrem 4-TS:
www.tremcosealants.com/#sle. (18, GG)
 - n. Tremco Commercial Sealants & Waterproofing; Tremsil 200:
www.tremcosealants.com/#sle. (1, GG)
 - o. Tremco Commercial Sealants & Waterproofing; Tremsil 400:
www.tremcosealants.com/#sle. (42 g/L)
- B. Type BB - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
- 1. Color: White.
 - 2. Products:
 - a. Pecora Corporation; Pecora 898 NST (Non-Staining Technology):
www.pecora.com/#sle. (82, GG)
 - b. Sika Corporation:Sikasil GP: www.usa.sika.com/#sle. (29)

2.06 NON-SAG ACRYLIC SEALANTS

- A. Type ___ - Acrylic-Urethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; paintable; not expected to withstand continuous water immersion or traffic.
- 1. Movement Capability: Plus and minus 12-1/2 percent, minimum.
 - 2. Hardness Range: 15 to 40, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: White.
 - 4. Service Temperature Range: Minus 40 to 180 degrees F.
 - 5. Products:

- a. Sherwin-Williams Company; Shermax Urethanized Elastomeric Sealant:
www.sherwin-williams.com/#sle.(1)
- b. Top Gun, a brand of PPG Architectural Coatings; Top Gun 400:
www.ppgpaints.com/#sle. (2)

2.07 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
 3. Open Cell: 40 to 50 percent larger in diameter than joint width.
 4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Outlet Box Sealant: Resilient sealer pads; use to seal back and sides of all junction boxes recessed in acoustically-rated partitions.
 1. Fire-Rated Partitions: Hevi-Duty Nelson FSP Firestop Putty Pads, or equal (no known equal)
 2. Non-Fire-Rated Partitions: Lowry's Outlet Box Pad, or equal (no known equal).
- E. Compressible Tape: 1/4-inch-thick, double-sided, closed-cell foam tape; use to seal interior partitions to window mullions.
 1. Norseal V988, 3M 4992, or equal
- F. Foam Sealing Tape:
 1. General: Open-cell, flexible, polyurethane foam impregnated with synthetic resin and developed to expand into openings and create seals which are airtight, thermally efficient, and vapor permeable.
 2. Applications: Door and window shim spaces at heads and jambs, and elsewhere as indicated.
 3. Basis-of-Design Product: Tremco Incorporated; ExoAir Trio.

4. Tape Width: As required for intended applications.
- G. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- H. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
 2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
 3. Arrange for sealant manufacturer's technical representative to be present during tests.
 4. Record each test on Preinstallation Adhesion Test Log as indicated.
 5. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
 6. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
 1. Remove paints from joint surfaces except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer.
 2. Remove wax, oil, grease, dirt film residues, temporary protective coatings and other residues by wiping with cleaner recommended for that purpose.
 3. Remove dust by blowing clean with oil-free, compressed air.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.
- F. For previously sealed joints, remove all traces of previous sealant and joint backer by mechanical methods, such as by cutting, grinding and wire brushing, in manner not damaging to surrounding surfaces.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
 - 1. Width/depth ratio of 2:1.
 - 2. Neck dimension no greater than 1/3 of the joint width.
 - 3. Surface bond area on each side not less than 75 percent of joint width.
- E. Fit joint backer securely by compressing backer material 25 percent to 40 percent so no displacement occurs during tooling. Avoid stretching or twisting joint backer.
- F. Install bond breaker backing tape where backer rod cannot be used, adhering strictly to the manufacturers installation requirements.
- G. Prime joint substrates where required. Use and apply primer according to sealant manufacturers recommendations. Confine primers to sealant bond surfaces; do not allow spillage or migration onto adjoining surfaces.
- H. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- I. Install sealants to uniform cross-sectional shapes with depths relative to joint widths that allow optimum sealant movement capability as recommended by sealant manufacturer.
- J. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- K. Tool sealants in manner that forces sealant against back of joint, ensures firm, full contact at joint interfaces and leaves a finish that is smooth, uniform and free of ridges, wrinkles, sags, air pockets and embedded impurities.

- L. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- M. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - NTU Quality Requirements for additional requirements.
- B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- C. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.
- D. Destructive Adhesion Testing: If there are any failures in first 1,000 linear feet, notify Architect immediately.
- E. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
- F. Repair destructive test location damage immediately after evaluation and recording of results.

3.05 PROTECTION

- A. Protect sealants from contact with contaminating substances and from damage from construction operations. Cut out, remove and replace contaminated or damaged sealants immediately, so that they are without contamination or damage at time of Substantial Completion.

3.06 CLEANING

- A. Construction Waste Management: Manage construction waste in accordance with provisions of Section 01 74 19 - Construction Waste Management and Disposal. Submit documentation for CALGreen compliance in accordance with Division 1 Sustainable Design Requirements.

3.07 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width, i.e., at low temperature in thermal cycle. Report failures immediately and repair them.

END OF SECTION

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- C. Section 08 14 16 - Flush Wood Doors.
- D. Section 08 71 00 - Door Hardware.
- E. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.
- F. Section 09 90 00 - Painting and Coating: Field finishing.

1.03 ABBREVIATIONS AND ACRONYMS

- A. ANSI: American National Standards Institute.
- B. HMMA: Hollow Metal Manufacturers Association.
- C. NAAMM: National Association of Architectural Metal Manufacturers.
- D. NFPA: National Fire Protection Association.
- E. SDI: Steel Door Institute.
- F. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.
- C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2020.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.

- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2022.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- I. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2016.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.
- N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- O. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.

1.05 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
 - 2. Product Data for CALGreen 5.504.4.3 – Finish Material Pollutant Control; Architectural paints and coatings, including printed statement of VOC content and chemical components.
 - 3. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: <https://steeldoor.org/sdi-certified/#sle>.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 4. Steelcraft, an Allegion brand: www.allegion.com/#sle.
- B. Sound-Rated Hollow Metal Doors and Frames:
 1. AMBICO Limited: www.ambico.com/#sle.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.

4. Door Edge Profile: Manufacturers standard for application indicated.
 5. Typical Door Face Sheets: Flush.
 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
- B. Hollow Metal Panels: Same construction, performance, and finish as doors.
- C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Type A , Interior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 20 gauge, 0.032 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
 2. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Interior Door Frames, Non-Fire Rated: Slip-on type at gypsum board walls, and knock-down type at masonry walls.
 - 1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch, maximum, above floor at 45 degree angle.
 - 2. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
- D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- E. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- F. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Architectural Paints and Coatings including aerosol paint and coating systems.
- B. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

- A. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- B. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Install door hardware as specified in Section 08 71 00 - Door Hardware.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- D. Comply with glazing installation requirements of Section 08 80 00 - Glazing.
- E. Coordinate installation of electrical connections to electrical hardware items.
- F. Touch up damaged factory finishes.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 14 16 - FLUSH WOOD DOORS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Flush wood doors; flush configuration; non-rated.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Requirements for certified wood and low-emitting materials.
- C. Section 08 11 13 - Hollow Metal Doors and Frames.
- D. Section 08 71 00 - Door Hardware.
- E. Section 09 21 16 - Gypsum Board Assemblies.
- F. Section 09 90 00 - Painting and Coating: Field finishing of doors.

1.03 REFERENCE STANDARDS

- A. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2019c.
- B. AWI (QCP) - Quality Certification Program; Current Edition.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- E. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).
- F. WI (CCP) - Certified Compliance Program (CCP); Current Edition.

1.04 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
 - 2. Product Data for CALGreen 5.504.4.3 – Finish Material Pollutant Control; Architectural paints and coatings, including printed statement of VOC content and chemical components.

3. Product Data for CALGreen 5.504.4.5 – Composite Wood Products: For composite-wood products, showing requirements for formaldehyde as specified in Table 5.504.4.
 4. Refer to 01 81 13 - Sustainable Design Requirements: Requirements for certified wood and low-emitting materials.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
 - C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 2. Include certification program label.
 - D. Samples: Submit two samples of door veneer, 6 by 6 inches in size illustrating wood grain, stain color, and sheen.
 - E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
 - F. Test Reports: Show compliance with specified requirements for the following:
 1. Sound-retardant doors and frames; sealed panel tests are not acceptable.
 - G. Manufacturer's Installation Instructions: Indicate special installation instructions.
 - H. Manufacturer's qualification statement.
 - I. Specimen warranty.
 - J. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- B. Forest Stewardship Council (FSC) Certified Products:
 1. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
 2. Forest Certification: Provide components made with not less than 50 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. Woodwork Quality Assurance Program:

1. Comply with AWI (QCP) woodwork association quality assurance service/program in accordance with requirements for work specified in this section; www.awiqcp.org/#sle.
2. Comply with WI (CCP) woodwork association quality assurance service/program in accordance with requirements for work specified in this section; www.woodworkinstitute.com/#sle.
3. Provide labels indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
4. Provide designated labels on shop drawings as required by quality assurance program.
5. Provide designated labels on installed products as required by quality assurance program.
6. Submit documentation upon completion of installation that verifies this work is in compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Div 01 for additional warranty requirements.

PART 2 PRODUCTS**2.01 SUSTAINABLE DESIGN REQUIREMENTS**

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Adhesives and Sealants.
- B. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Composite Wood Products.
- C. Certified Wood: Wood doors shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-00 and FSC STD-40-004.

2.02 MANUFACTURERS

- A. Wood Veneer Faced Doors:

1. Masonite Architectural; Aspiro Select Wood Veneer Doors:
www.architectural.masonite.com/#sle.
2. Oregon Door: www.oregondoor.com/#sle.
3. VT Industries, Inc: www.vtindustries.com/#sle.

2.03 DOORS AND PANELS

- A. Doors: See drawings for locations and additional requirements.
 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 1. Provide solid core doors at each location.

2.04 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type structural composite lumber core (SCLC), plies and faces as indicated.

2.05 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Oak (match existing), veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 1. Vertical Edges: Any option allowed by quality standard for grade.
 2. "Running Match" each pair of doors and doors in close proximity to each other.
 3. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.
- B. Facing Adhesive: Type I - waterproof.

2.06 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 1. Provide solid blocks at lock edge for hardware reinforcement.
 2. Provide solid blocking for other throughbolted hardware.
- C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.

- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Provide edge clearances in accordance with the quality standard specified.

2.07 FINISHES - WOOD VENEER DOORS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Architectural Paints and Coatings including aerosol paint and coating systems.
- B. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
 - 1. Transparent:
 - a. System - TR-8, UV Cured Acrylated Polyester/Urethane.
 - b. Stain: As selected by Architect.
 - c. Sheen: Semigloss.
- C. Factory finish doors in accordance with approved sample.
- D. Seal door top edge with transparent sealer to match door facing.

2.08 ACCESSORIES

- A. Hollow Metal Door Frames: See Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Metal Louvers:
 - 1. Material and Finish: Roll formed steel; pre-painted finish to color as selected.
 - 2. Louver Blade: Inverted V blade, sight proof, light proof.
 - 3. Louver Free Area: 50 percent.
 - 4. Frame: square profile style with tamper proof fasteners.
- C. Door Hardware: See Section 08 71 00 - Door Hardware.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
 - 2. Install smoke and draft control doors in accordance with NFPA 105 requirements.
 - 3. Install exterior doors in accordance with ASTM E2112.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Field-Finished Doors: Trimming to fit is acceptable.
 - 1. Adjust width of non-rated doors by cutting equally on both jamb edges.
 - 2. Trim maximum of 3/4 inch off bottom edges.
- D. Use machine tools to cut or drill for hardware.
- E. Coordinate installation of doors with installation of frames and hardware.
- F. Install door louvers plumb and level.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION

SECTION 08 42 29 - AUTOMATIC SLIDING DOORS**PART 1 GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY

- A. This section includes the following types of automatic entrances:
 - 1. Exterior and interior, single and bi-parting sliding automatic entrances.
- B. Related Sections:
 - 1. Section 07 92 00 Joint Sealants r caulking to the extent not specified in this section.
 - 2. Section 08 43 13 - NTU Aluminum- Framed Storefronts for entrances furnished and installed separately
 - 3. Section 08 71 00 - NTU Door Hardware” for hardware to the extent not specified in this section.
 - 4. Section 08 80 00 - NTU Glazing for materials and installation requirements of glazing for automatic entrances.
 - 5. Division 26 and 28 Sections for electrical connections including conduit and wiring for automatic entrance operators and access-control devices.

1.03 DEFINITIONS

- A. Activation device: Device that, when actuated, sends an electrical signal to the door operator to initiate the door operation.
- B. Monitored Safety Devices: A tested system that works in conjunction with the automatic door control that detects the presence of a person or an object within a zone where contact could occur and provides a signal to stop the movement of the door.
- C. AAADM: American Association of Automatic Door Manufacturers.
- D. For automatic door terminology, refer to ANSI/BHMA A156.10 for definitions of terms

1.04 REFERENCES

- A. References: Refer to the version year adopted by the Authority Having Jurisdiction
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities
 - 2. ICC/IBC - International Building Code

- 3. CUL – Approved for use in Canada.
- 4. NFPA 70 - National Electrical Code.
- 5. NFPA 101 - Life Safety Code
- B. American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA).
 - 1. ANSI/BHMA A156.10 (current year) American National Standard for Power Operated Pedestrian Doors.
 - 2. ANSI Z97.1 Standards for Safety Glazing Material Used in Buildings
- C. Underwriters Laboratories (UL).
 - 1. UL 325 Standard for Safety for Door, Drapery, Gate, Louver and window Operators and Systems
- D. American Association of Automatic Door Manufacturers (AAADM).
- E. American Society for Testing and Materials (ASTM).
 - 1. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
 - 2. ASTM B209 Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
- F. American Architectural Manufacturers Association (AAMA).
 - 1. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.
- G. National Association of Architectural Metal Manufacturers (NAAMM).
 - 1. Metal Finishes Manual for Architectural Metal Products.
- H. International Code Council (IBC).
 - 1. IBC: International Building Code Building Code.

1.05 PERFORMANCE REQUIREMENTS

- A. General: Provide automatic doors that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturers corresponding systems.
- B. Compliance:
 - 1. ICC/IBC International Building Code

- C. ANSI/BHMA A 156.10 American National Standard for Power Operated Doors Pedestrian Doors.
 - 1. UL 325 Certified
 - 2. NFPA 70 National Electrical Code.
 - 3. NFPA 101 Life Safety Code
 - 4. CUL Approved for use in Canada
- D. Automatic Door equipment accommodates medium to heavy pedestrian traffic.
- E. Automatic Door equipment accommodates up to the following weights for active leaf door:
 - 1. Bi-Parting Doors: 220 lb (100 kg) per active breakout leaf.
 - 2. Single Slide Doors 220 lb (100 kg) per active breakout leaf.
- F. Operating Temperature Range: Capable of - Minus 35 Degrees F to plus 130 degrees F (minus 37 C to plus 55 degrees C) ambient.
- G. Entrapment Force Requirements:
 - 1. Power-Operated Sliding Doors: Not more than 30 lbf (133 N) required to prevent stopped door from closing.
- H. Sliding doors provided with a breakaway device shall require no more than 50 lbf (222 N) applied 1 inch (25 mm) from the leading edge of the lock stile for the breakout panel to open.

1.06 SUBMITTALS

- A. See Div 01 ,for submittal procedures.
- B. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles fabrication, operational descriptions and finishes
- C. Shop Drawings: For automatic entrances. Include plans, elevations, sections, details, hardware mounting heights, additional accessories and attachments to other work.
- D. Samples: Color samples of exposed finish as required.
- E. Informational Submittals: Manufacturers product information and applicable sustainability program credits that are available towards a LEED rated product certification.
 - 1. Credit MR 4.1 and 4.2: Manufacture's or fabricator's certificate indicating percentage of post-consumer recycled content by weight and pre-consumer recycled content by weight for each product specified under this section.

- F. Manufacturers Field Reports: Submit manufacturer's field reports from AAADM certified technician of inspection and approval of doors for compliance with ANSI/BHMA A 156.10 after completion of installation.
- G. Operating and Maintenance Manuals: Provide manufacturers operating, owners and maintenance manuals for each item specified as required in Division 01, Closeout Submittals.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings to receive automatic entrances by field measurements before fabrication.

1.08 COORDINATION

- A. Coordinate sizes and locations of recesses in concrete floors for recessed sliding tracks that control automatic entrances. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Coordinate hardware for automatic entrances with hardware required for rest of project.
- C. Electrical System Roughing-in: Coordinate layout and installation of automatic entrances with connections to power supplies and access-control system.

1.09 QUALITY ASSURANCE

- A. Manufacturer Qualifications: 10 years minimum of documented experience in manufacturing door equipment similar to that indicated within this specification with a proven record of successful service performance. A manufacturer with company certificate issued by AAADM.
- B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 5 years documented experience installing and maintenance of units similar in material, design, and extent to that indicated in this specification and whose work has resulted in construction with a record of successful in-service performance. Manufacturer's authorized representative who is trained and approved for installation and maintenance of units by AAADM required for this Project.
- C. Source Limitations for Automatic Entrances: Obtain automatic entrances from single source from single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Power-Operated Door Standard: ANSI/BHMA A156.10 Current year.
- F. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.

- G. Pre-installation Conference: Conduct conference at site or a mutually agreed site if required.

1.10 WARRANTY

- A. Automatic Entrance Doors shall be free of defects in material and workmanship for a period of One (1) year from the date of substantial completion.
- B. During the warranty period a factory trained technician shall preform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form submitted to the owner.
- C. During the warranty period all warranty work shall be performed during normal working hours.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 SLIDING AUTOMATIC ENTRANCES

- A. Sliding Automatic Entrance Door Assemblies:
1. Basis of Design: dormakaba, Inc: www.dormakaba.com/#sle. or equal
 2. Model: dormakaba ESA Series ESA 200 Bi Parting Fixed Sidelite Automatic Doors (Basis of Design)
 - a. Sliding Automatic Door Configuration:
 - 1) Bi-Parting, fixed sidelite, door system.
 - 2) Configuration: Two sliding leaves and two and two fixed panels.
 - 3) Traffic Pattern: Two –Way
 - b. Emergency Breakaway Capability: Exterior sliding leaves only.
 - 1) Mounting: Between jambs
 3. Dimensions: Confirm door package dimensions as indicated on architectural drawings.
 4. Substitutions: See Section 01 60 00 - Product Requirements. Requests for substitution and product approval in compliance with the specification must be submitted in writing and in accordance with the procedures outlined in Division 1, Section “Substitution Procedures”. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.03 ALUMINUM DOORS AND FRAMES

- A. Doors and Frames: Extruded Aluminum, Alloy 6063-T5

1. Door panels shall have a minimum .125 inch (3.2 mm) structural wall thickness throughout entire extrusion length.
 2. Door construct shall be by means of interlocking corner shear block cross bolted.
 3. The sliding door system shall include two interlocks securing the leading stile of the sidelite and the butt stile of the sliding door together.
 4. Vertical Stiles shall be:
 - a. Medium stile: 4-1/2 inch
 5. Bottom Rails shall be standard size:10 inch nominally.
 6. Intermediate Muntin shall be 3-¼ inch
 7. Weather stripping shall meet AAMA 701-11 Class A, slide in type, replaceable nylon retained by the aluminum extrusions to reduce energy loss. The following types of weather-stripping are required: nylon pile weather stripping on the door bottoms; dual pile weather-stripping at sliding door lead edges; weather-stripping between the carrier and header on the sliding doors; dual pile weather-stripping at the interlock rails between the sliding door and sidelites; dual pile weather-weather-stripping between the sidelites doors and the door jambs.
- B. Glass: Glazing shall comply with ANSI Z97.1 thickness as indicated.
1. Glazing Active Door Panels 1/4" (6 mm) to 1 ¼" (32 mm) tempered unless otherwise specified.
 2. Glazing Sidelite Door Panels 1/4" (6 mm) to 1 ¼" (32 mm) tempered unless otherwise specified
 3. Glazing Transom Panel 1/4" (6 mm) tempered, unless otherwise specified
 4. Glazing Installation: Review Division 8 Section for glazing requirements.

2.04 DOOR OPERATORS

- A. Sliding Door Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of delrin-covered, ball-bearing-center wheels operating on a continuous roller track. Support doors from carrier assembly by adjustable cantilever and pivot assembly.
1. Rollers: Minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.
- B. Operator and Controller: a system with an electro-mechanical operator and microprocessor controller. Components consist of a DC permanent magnet motor, self-lubricating drive system and a wear-free digital rotary encoder all linked to a fully integrated digital microprocessor controller

1. Features:
 - a. Power opening and closing.
 - b. Drive System: belt
 - c. Adjustable opening and closing speeds.
 - d. Adjustable hold-open time between 0 and 30 seconds.
 - e. Obstruction recycle.
 - f. Intergraded access control capabilities.
2. Door Switches: Interior side mounted program switches consisting of:
 - a. Main Switch-Auto-Close-Open, operates door in fully automatic mode, turns door off, or keeps it fully open.
 - b. Exit Only Switch: on/off, only exit side activation device will initiate door opening.
3. Partial Opening Switch: on/off Energy saving opening mode limits the width opening.
 - a. Switch: rocker
4. Controller shall provide a means to verify presence sensor functionality and the connection between the controller and sensor(s) as required by the ANSI 156.10 standard. This closed loop monitoring system, upon detection of fault in the sensor or wiring shall cause automatic operation to cease.

2.05 ACTIVATION AND SAFETY

- A. Provide controls in accordance with ANSI/BHMA standard for condition of exposure and for long-term, maintenance-free operation under normal traffic load. Only safety systems (sensors) that have been tested and approved should be used in conjunction with manufacturer systems and products.
- B. Monitored Combination Motion/Presence Sensors: Self-contained units; consisting of both motion and presence sensors in a single housing; adjustable to provide detection field sizes and functions required by ANSI/BHMA A156.10.
 1. Motion Sensor: K-band-frequency, doppler effect radar.
 - a. Provide capability for switching between bidirectional and unidirectional detection.
 - b. For one-way-traffic entrances, sensor on egress side shall not be active when doors are fully closed.
 2. Presence Sensor(s): Active infrared sensor shall provide two over lapping zones that provide presence detection in the threshold while the door is in the open position.
- C. Activation Device:

1. Touchless Wave Plate: 4-1/2 inch square activation sensor plate in black. Microwave technology has an adjustable range of 2 inches to 24 inches.
 2. Access control activator: as selected by architect.
- D. Safety beams are not acceptable.

2.06 ELECTRICAL

- A. Electrical 120 VAC, 60 Hz, 5 Amp service.
- B. Battery Back-up: Concealed in the door header case and capable of full operation including sensor capabilities for 200 cycles

2.07 HARDWARE

- A. General: Provide manufacturers standard hardware as required for proper door operation.
- B. Break away hardware are integral parts of the door design and are supplied by the manufacturer to comply with applicable codes.
1. ESA 200 has an ITS 96 concealed Hydraulic door closer to return the door to its original position.
- C. Locking Hardware:
1. Deadbolts: Laminated-steel hook, mortise type, BHMA A156.5, Grade 1.
 2. Two-Point Locking for Sliding Doors: Mechanism in stile of active door leaf that automatically extends second lock-bolt into overhead carrier assembly.
 - a. Thumb turn Interior key exterior. Keyed both sides Lock indicators if required by code.
- D. Threshold:
1. Sliding Door Threshold: ESA 200 Manufacturer's standard threshold members and bottom-guide track system, with a surface mounted bottom guide system with a 1" diameter ball-bearing roller wheel.
 - a. Configuration: No threshold across door opening and recessed guide track system at sidelites.

2.08 ALUMINUM FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Anodized Finish:
1. Dark Bronze Anodic Finish: AAMA 611, AA-M12C22A44, Class I, 0.018 mm.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that electric power is available and is of the correct characteristics.
- B. Examine doors and frames with Installer present, for compliance with requirements for installation tolerances, wall and floor construction and other conditions affecting performance of automatic entrances.
- C. Examine roughing in for electrical source power to verify actual locations of wiring connections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
 - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 - 2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.
- D. Glazing: Install glazing as specified in Division 08 Section Glazing according to automatic door manufactures instructions.
- E. Sealants: Comply with requirements specified in Division 07 Section "Joint Sealants" to provide weathertight installation.
- F. Signage: Apply signage on both sides of each door and each sidelight as required by ANSI/BHMA A 156.10
- G. Install equipment in accordance with manufacturer's instructions.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's representative shall provide technical assistance and guidance for installation of automatic doors.
 - 1. Factory trained and AADM certified representative shall test and inspect each automatic door to determine compliance of the installed system to ANSI/BHMA A 156.10

3.04 ADJUSTING

- A. Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure; comply with requirements in ANSI/BHMA A156.10

3.05 CLEANING

- A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
 - 1. Comply with requirements in Division 08 Section "Glazing" for cleaning and maintaining glass.
- B. Remove temporary protection, clean exposed surfaces.

3.06 CLOSEOUT ACTIVITIES

- A. Engage a factory authorized representative to train Owner's maintenance personnel to adjust, operate, and maintain safe operation of automatic entrances

END OF SECTION

SECTION 08 43 13 - ALUMINUM-FRAMED STOREFRONTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront, with vision glass.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
- D. Section 08 80 00 - Glazing: Glass. Glazing accessories.
- E. Section 12 24 00 - Window Shades: Attachments to framing members.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- G. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- J. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

- K. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- L. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).
- M. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- C. Samples: Submit two samples minimum 12 x 12 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
- D. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- E. Certificate of NFRC Compliance and test report including center-of-glass U value and corresponding overall U value.
- F. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- G. Manufacturer's qualification statement.
- H. Installer's qualification statement.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
 - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
 - a. Insulating Glass Certification Council (IGCC).

- b. Safety Glazing Certification Council (SGCC).
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- 1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.
 - a. North American Contractor Certification (NACC) for glazing contractors.
 - b. Equivalent independent third-party ANSI accredited certification.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. See Section 01 78 39 - Project Record Documents for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water leakage through fixed glazing and framing areas
 - 2. Warranty Period: Five years from date of Substantial Completion.
- D. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

- E. Special Finish Warranty for High-Performance Organic Coatings: Provide 20 year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Kawneer North America www.kawneer.com/#sle.
- B. Other Acceptable - Aluminum-Framed Storefronts Manufacturers, subject to compatibility with configurations shown in the drawings:
 - 1. Arcadia, Inc: www.arcadiainc.com/#sle.
 - 2. C.R. Laurence Company, Inc; U.S. Aluminum: www.crl-arch.com/#sle.
 - 3. Oldcastle BuildingEnvelope: www.oldcastlebe.com/#sle.
- C. Storefronts, entrances, and venting windows shall all be products of the Storefront Manufacturer and shall be designed for compatibility and consistent performance characteristics.

2.02 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices, thermally broken with interior section insulated from exterior. **Kawneer 451T** or approved equal.
 - 1. Glazing Rabbet: For 1 inch insulating glazing.
 - 2. Glazing Position: Centered (front to back).
 - 3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
 - 4. Finish Color: As selected by Architect from manufacturer's standard line.
 - 5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of ASCE 7.
 - b. Positive Design Wind Load: 25 lbf/sq ft.
 - c. Negative Design Wind Load: 25 lbf/sq ft.
 - d. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
3. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
4. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
5. Overall U-value Including Glazing: 0.47 Btu/(hr sq ft deg F), maximum.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 1. Framing members for interior applications need not be thermally broken.
 2. Glazing Stops: Flush.
 3. Structurally Reinforced Members: Where required provide Extruded aluminum with internal reinforcement of structural steel member.
 4. Thermal break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- B. Glazing: See Section 08 80 00 - Glazing.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209/B209M.
- C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.
- D. Fasteners: Stainless steel.
- E. Exposed Flashings: Aluminum sheet, 20 gauge, 0.032 inch minimum thickness; finish to match framing members.
- F. Concealed Flashings: Stainless steel, 26 gauge, 0.0187 inch minimum thickness.
- G. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
- H. Sealant for Setting Thresholds: Non-curing butyl type.
- I. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- J. Glazing: See Section 08 80 00 - Glazing
- K. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.05 FINISHES

- A. Factory finish all surfaces that will be exposed in completed assemblies.
 - 1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - 2. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
- B. Superior Performing Organic Coatings System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
 - 1. Manufacturers:
 - a. PPG; Duranar: www.ppgmetalcoatings.com/#sle.
 - b. Sherwin-Williams Company; Fluropon: www.coil.sherwin.com/#sle.
- C. Color: As selected by Architect from manufacturer's standard range.
- D. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install all systems in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
 - 1. Coordinate with Greenhouse provider for installation at greenhouse structures.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Install glass and infill panels using glazing method required to achieve performance criteria; see Section 08 80 00 - Glazing.
- J. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

- A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.

- B. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 71 00 - DOOR HARDWARE**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Hardware for wood and glass partition doors.
- B. Electrically operated and controlled hardware.
- C. Lock cylinders for doors that hardware is specified in other sections.
- D. Thresholds.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 08 11 13 - Hollow Metal Doors and Frames.
- C. Section 08 14 16 - Flush Wood Doors.
- D. Section 08 42 29 - Automatic Sliding Doors

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. BHMA A156.21 - Thresholds; 2019.
- C. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2016.
- D. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.
- E. DHI (H&S) - Sequence and Format for the Hardware Schedule; 2019.
- F. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
- G. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; 1993; also in WDHS-1/WDHS-5 Series, 1996.
- H. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- I. ITS (DIR) - Directory of Listed Products; Current Edition.
- J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- K. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- L. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- M. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- C. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

1.05 SUBMITTALS

- A. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- B. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 - 2. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
 - 3. List groups and suffixes in proper sequence.
 - 4. Provide complete description for each door listed.
 - 5. Provide manufacturer name, product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
 - 6. Include account of abbreviations and symbols used in schedule.
- C. Samples for Verification:
 - 1. Submit minimum size of 2 by 4 inch for sheet samples, and minimum length of 4 inch for other products.
 - 2. Submit one (1) sample of hinge, latchset, lockset, closer, and _____ illustrating style, color, and finish.
 - 3. Return full-size samples to Contractor.
 - 4. Submit product description with samples.

- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
 - 1. Submit manufacturer's parts lists and templates.
 - 2. Bitting List: List of combinations as furnished.
- F. Keying Schedule:
 - 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.
- G. Manufacturer's qualification statement.
- H. Installer's qualification statement.
- I. Supplier's qualification statement.
- J. Warranty.: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- K. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- L. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. Lock Cylinders: Ten for each master keyed group.

1.06 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Contractor.
- B. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.
- C. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

- A. See Section 01 78 39 - Project Record Documents for additional warranty requirements.

- B. Manufacturer's Warranty: Provide warranty against defects in material and workmanship for period indicated. Complete forms in Owner's name and register with manufacturer.
1. Closers: Five years, minimum.
 2. Locksets and Cylinders: Three years, minimum.
 3. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
1. Applicable provisions of federal, state, and local codes.
 - a. ICC (IBC)
 - b. NFPA 101
 2. Accessibility: ADA Standards and ICC A117.1.
 3. Applicable provisions of NFPA 101.
 4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), testing firm acceptable to authorities having jurisdiction, or _____ as suitable for application indicated.
 6. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
 7. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
 8. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.
- D. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. See Door Hardware Schedule.
- E. Closers:
1. Provide door closer on each exterior door, unless otherwise indicated

2. Provide door closer on each fire-rated and smoke-rated door.
3. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.

F. Fasteners:

1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - a. Aluminum fasteners are not permitted.
 - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
 - a. Self-drilling (Tek) type screws are not permitted.
3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
4. Provide solid backing for hardware mounting at stud framed walls.
5. Provide spacers or sex bolts with sleeves for through bolting of hollow metal doors and frames.
6. Fire-Rated Applications: Comply with NFPA 80.
 - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.02 HINGES

A. Manufacturers: Conventional butt hinges

1. Basis of Design: BEST: dormakaba Group: www.bestaccess.com/#sle..

B. Properties:

1. Butt Hinges: As applicable to each item specified
 - a. Butt Hinges: As applicable to each item specified
 - b. Template screw hole locations
 - c. Bearing assembly installed after plating
 - d. Bearings: Concealed fully hardened bearings

- e. Bearing Shells: Shapes consistent with barrels
 - f. Pins: Easily seated, non-rising pins
 - 1) Fully plate hinge pins
 - 2) Non-Removable Pins: Slotted stainless steel screws
 - g. UL 10C listed for fire-resistance-rated doors
- C. Sizes: See Door Hardware Schedule
- 1. Hinge Widths: As required to clear surrounding trim.
 - 2. Sufficient size to allow 180 degree swing of door.
- D. Finishes: See Door Hardware Schedule.
- 1. Fully polish hinges; front, back, and barrel
- E. Grades:
- 1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges
 - 2. Comply with BHMA A156.18 Materials and Finishes.
- F. Material: Base metal as indicated for each item by BHMA material and finish designation.
- G. Types:
- 1. Butt Hinges: Include full mortise hinges.
- H. Quantities:
- 1. Butt Hinges: Three (3) hinges per leaves up to 90 inches (2286 mm) in height. Add one (1) for each additional 30 inches (762 mm) in height or fraction thereof.
 - a. Hinge weight and size unless otherwise indicated in hardware sets:
 - 1) For doors up to 36 inches (914 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.134 inch (3.4 mm) and a minimum of 4-1/2 inches (114 mm) in height.
 - 2) For doors from 36 inches (914 mm) wide up to 42 inches (1067 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.145 inch (3.7 mm) and a minimum of 4-1/2 inches (114 mm) in height.
 - 3) For doors from 42 inches (1067 mm) wide up to 48 inches (1219 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.

- 4) For doors greater than 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.

I. Applications: At swinging doors.

1. Provide non-removable pins at out-swinging doors with locking hardware and all exterior doors

J. Products:

1. Butt Hinges:
 - a. Concealed bearing, five (5) knuckle

2.03 CYLINDRICAL LOCKS

A. Manufacturers:

1. Basis of Design: dormakaba;.dormakaba Group: www.dormakaba.com/us-en/#sle.

B. Properties:

1. Mechanical Locks:
 - a. Fitting modified ANSI A115.2 door preparation.
 - b. Door Thickness Fit: 1-3/8 inches (35 mm) to 2-1/4 inches (57 mm) thick doors.
 - c. Construction: Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.
 - 1) Through-bolted anti-rotational studs.
 - d. Bored Hole: 2-1/8 inch (54 mm) diameter.
 - e. Backset: 2-3/4 inches (70 mm) unless otherwise indicated.
 - f. Latch: Single piece tail-piece construction.
 - 1) Latchbolt Throw: 1/2 inch (12.7 mm), minimum.
 - g. Cylinders:
 - 1) Cylinder Core Types: Locks capable of supporting manufacturers' cores, as applicable.
 - (a) Conventional.
 - h. Lever Trim:
 - 1) Style: See Door Hardware Schedule.

- i. Outside Lever Sleeve: Seamless one-piece construction.
- C. Finishes: See Door Hardware Schedule.
 - 1. Core Faces: Match finish of lockset
- D. Grades: Comply with BHMA A156.2, Grade 1.
- E. Material: Manufacturer's standard for specified lock.
 - 1. Products: Cylindrical locks, including mechanical types.
 - 2. C100 (Grade 1).

2.04 MORTISE LOCKS

- A. Manufacturers:
 - 1. Basis of Design: dormakaba.; dormakaba Group: www.dormakaba.com/us-en/#sle
- B. Properties:
 - 1. Mechanical Locks: Manufacturer's standard.
 - a. Fitting modified ANSI A115.1 door preparation.
 - b. Door Thickness Coordination Fitting 1-3/4 inch (44 mm) to 2-1/4 inch (57 mm) thick doors.
 - c. Latch: Solid, one-piece, anti-friction, self-lubricating stainless steel.
 - 1) Latchbolt Throw: 3/4 inch (19 mm), minimum.
 - d. Auxiliary Deadlatch: One piece stainless steel, permanently lubricated.
 - e. Backset: 2-3/4 inch (70 mm).
 - f. Lever Trim:
 - 1) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.
 - 2) Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs (158.2 Nm) of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
 - 3) Spindle: Designed to prevent forced entry from attacking of lever.
 - 4) Independent spring mechanism for each lever.
 - (a) Trim to be self-aligning and thru-bolted.
- C. Finishes: See Door Hardware Schedule.

- 1. Core Faces: Match finish of lockset.
- D. Options:
 - 1. Visual occupancy indicator on restroom doors.
- E. Products: Mortise locks, including standard types.
 - 1. M9000.

2.05 CLOSERS

- A. Manufacturers:
 - 1. Basis of Design: dormakaba.dormakaba Group: www.dormakaba.com/us-en/#sle.
- B. Properties:
 - 1. Surface Mounted Closers: Manufacturer's standard.
 - a. Construction: R14 high silicon aluminum alloy.
 - b. Mechanism: Separate tamper-resistant adjusting valves for closing and latching speeds.
 - 2. Hydraulic Fluid: All-weather type.
 - a. Arm Assembly: Standard for product specified.
 - b. Covers:
 - 1) Type: Standard for product selected.
 - (a) Slim.
 - 2) Material: Plastic.
 - 3) Finish: Painted.
- C. Grades:
 - 1. Closers: Comply with BHMA A156.4, Grade 1.
 - a. Underwriters Laboratories Compliance:
 - 1) Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.
 - (a) UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.
- D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

1. Devices listed with California Department of Forestry and Fire Protection, Office of the State Fire Marshal.

E. Types:

1. Rack-and-pinion, surface-mounted. 1-1/2 inches (38 mm) minimum bore.

F. Installation:

1. Mounting: Includes surface mounted installations.
2. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.
3. At outswinging exterior doors, mount closer on interior side of door.
4. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
5. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.

G. Products:

1. Surface Mounted:
 - a. 8600.

2.06 PROTECTION PLATES

A. Manufacturers:

B. Properties:

1. Plates:
 - a. Kick Plates: Provide along bottom edge of push side of doors indicated in hardware sets.
 - 1) Size: 10 inches (254 mm) high by 2 inch (51 mm) less door width (LDW) on push side of door.
 - b. Mop Plates: Provide along bottom edge of push side of doors to provide protection from cleaning liquids and equipment damage to door surface.
 - 1) Size: 6 inch (152 mm) high by 1 inch (38 mm) less door width (LDW) on pull side and 2 inch (51 mm) LDW on push side of door.
 - c. Edges: Beveled, on four (4) unless otherwise indicated.

C. Grades: Comply with BHMA A156.6.

D. Material: As indicated for each item by BHMA material and finish designation.

1. Metal Properties: Stainless steel.
 - a. Metal, Standard Duty: Thickness 0.050 inch (1.27 mm), minimum.

E. Installation:

1. Fasteners: Countersunk screw fasteners

2.07 STOPS AND HOLDERS

A. Manufacturers:

1. Basis of Design: Trimco: www.trimcohardware.com/#sle.

B. General: Provide overhead stop/holder when wall or floor stop is not feasible.

C. Grades:

1. Wall Bumpers: Comply with BHMA A156.16 and Resilient Material Retention Test as described in this standard.

D. Material: Base metal as indicated for each item by BHMA material and finish designation.

E. Types:

1. Wall Bumpers: Bumper, concave, wall stop.

F. Installation:

1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.

G. Products:

1. Wall Bumpers

2.08 THRESHOLDS

A. Manufacturers: As indicated on drawings

B. Thresholds: Comply with BHMA A156.21.

1. Provide threshold at interior doors for transition between two different floor types where indicated.
2. Type: Flat surface.
3. Material: Aluminum.
4. Threshold Surface: Fluted horizontal grooves across full width.

5. Field cut threshold to profile of frame and width of door sill for tight fit.

2.09 SILENCERS

- A. Manufacturers:
- B. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
 1. Single Door: Provide three on strike jamb of frame.
 2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
 3. Material: Rubber, gray color.

2.10 KEY AND CORES

- A. Manufacturers:
 1. Match existing key system.
- B. Properties: Complying with guidelines of BHMA A156.28.
 1. Provide conventional cores.
 2. Match existing key system.
 3. Provide keying information in compliance with DHI (KSN) standards.
 4. Keying Schedule: Arrange for a keying meeting, with Architect, Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements.
 5. Keying: Master keyed.
 6. Include construction keying and control keying with removable core cylinders.
 7. Supply keys in following quantities:
 - a. Change Keys: 2 each for each keyed core.
 8. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
 9. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.
 10. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."

11. Include installation of permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier

2.11 FINISHES

- A. Finishes: Identified in Hardware Sets.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Correct all defects prior to proceeding with installation
- C. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware using the manufacturer's fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.
- C. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- D. Use templates provided by hardware item manufacturer.
- E. Do not install surface mounted items until application of finishes to substrate are fully completed.
- F. Wash down masonry walls and complete painting or staining of doors and frames.
- G. Complete finish flooring prior to installation of thresholds
- H. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
 2. For Steel Doors and Frames: See Section 08 11 13.
 3. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
 4. Flush Wood Doors: See Section 08 14 16.
 5. Mounting heights in compliance with ADA Standards:

- a. Locksets: 40-5/16 inch.
 - b. Push Plates/Pull Bars: 42 inch.
 - c. Deadlocks (Deadbolts): 48 inch.
 - d. Exit Devices: 40-5/16 inch.
 - e. Door Viewer: 43 inch; standard height 60 inch.
- I. Include in installation for existing doors and frames any necessary field modification and field preparation of doors and frames for new hardware. Provide necessary fillers, reinforcements, and fasteners for mounting new hardware and to cover existing door and frame preparations

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 01 40 00 - NTU Quality Requirements.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01 77 00 - Closeout Procedures.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.05 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 PROTECTION

- A. Protect finished Work under provisions of Section 01 77 00 - Closeout Procedures.
- B. Do not permit adjacent work to damage hardware or finish.

3.07 SCHEDULE

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for examining the Plans and Specifications and furnishing proper hardware for all openings

whether listed or not. If there are any omissions in hardware groups in regard to regular doors they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.

C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

D. Manufacturers Abbreviations (Mfr.)

BY		By Related Section
DM		Dorma Door Controls
ST		BEST Hinges and Sliding
TR		Trimco

E. Option List

CSK		COUNTER SINKING OF KICK and MOP PLATES

F. Finish List

10B		Satin Bronze, Oxidized, Relieved, and Oil Rubbed
613		Oxidized Satin Bronze, Oil Rubbed
613E		Dark Oxidized Satin Bronze - Equivalent
689		Aluminum Painted
695		Dark Bronze Painted
GRY		Grey

G. HARDWARE GROUPS

Hardware Group No. #01 Doors: LIB.A

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	BUTT HINGE	CB179 4.5" x 4.5"	20B	ST
1	EA	LOCKSET-OFFICE	C150D LCC (Match Existing Keyway)	613	DM
1	EA	CLOSER	8616 AF86	695	DM
1	EA	WALL BUMPER	1270WV	613E	TR
3	EA	SILENCER	1229A	GRY	TR

Hardware Group No. #02 - Doors: OFF.A

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	BUTT HINGE	C150D LCC (Match Existing Keyway)	10B	ST
1	EA	LOCKSET-OFFICE	ND53RD SPA	613	DM
1	EA	WALL BUMPER	1270WV	613E	TR
3	EA	SILENCER	1229A	GRY	TR

Hardware Group No. #03- Doors: RR.A, RR1.A, RR2.A, RR3.A, RR4.A, RR5.A

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	BUTT HINGE	CB179 4.5" x 4.5	10B	ST
1	EA	PRIVACY SET-VISUAL INDICATOR	M9046 LCA	613	DM
1	EA	CLOSER	8616 AF86	695	DM
1	EA	KICK PLATE	K0050 - 10" x 2" LDW CSK	613E	TR
1	EA	MOP PLATE	KM050 6" x 35" CSK	613E	TR
1	EA	WALL BUMPER	1270WV	613E	TR
3	EA	SILENCER	1229A	GRY	TR

Hardware Group No. #04 - Doors: JAN.A

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	BUTT HINGE	CB179 4.5" x 4.5"	10B	ST
1	EA	LOCKSET-STOREROOM	C180D LCC (Match Existing Keyway)	613	DM
1	EA	CLOSER	8616 AF86	695	DM
1	EA	KICK PLATE	K0050 - 10" x 2" LDW CSK	613E	TR
1	EA	MOP PLATE	KM050 6" x 35" CSK	613E	TR
1	EA	WALL BUMPER	1270WV	613E	TR
1	EA	SILENCER	1229A	GRY	TR

H. Hardware Group No. #05 - Doors: LOBBY.A

1			PROVIDED BY SECTION 084229	689	BY
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I. Hardware Group No. #06 - Doors: TEEN.A

1			PROVIDED BY SECTION 102215		BY
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J. Hardware Group No. #07 - Gate: EXTERIOR

1	EA	SELF CLOSING HINGE	Mammoth HD x Raptor	BLK	LO
1	EA	EXIT DEVICE	2114 X 4914A	630	PR

END OF SECTION

SECTION 08 80 00 - GLAZING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 07 25 00 - Weather Barriers.
- C. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
- D. Section 08 43 13 - Aluminum-Framed Storefronts.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- F. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
- J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

- K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
- L. GANA (GM) - GANA Glazing Manual; 2022.
- M. GANA (SM) - GANA Sealant Manual; 2008.
- N. GANA (LGRM) - Laminated Glazing Reference Manual; 2019.
- O. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2016).
- P. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2020.
- Q. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2020.
- R. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.
- S. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

- A. Product Data on Insulating Glass Unit, Glazing Unit, and _____ Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- C. Samples: Submit two samples 6 by 6 inch in size of glass units.
- D. Samples: Submit 6 inch long bead of glazing sealant, color as selected.
- E. Certificate: Certify that products of this section meet or exceed specified requirements.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
 - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
 - a. Insulating Glass Certification Council (IGCC).
 - b. Safety Glazing Certification Council (SGCC).
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.
 - 1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.
 - a. North American Contractor Certification (NACC) for glazing contractors.
 - b. Equivalent independent third-party ANSI accredited certification.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. See Section 01 78 39 - Project Record Documents for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
- C. Heat Soaked Tempered Glass: Provide a five (5) year manufacturer warranty to include coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS) inclusions.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Float Glass Manufacturers:
 - 1. Guardian Glass, LLC: www.guardianglass.com/#sle.

2. Pilkington North America Inc: www.pilkington.com/na/#sle.
3. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 1. Design Pressure: Calculated in accordance with ASCE 7.
 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7
 4. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 5. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
 1. In conjunction with weather barrier related materials described in other sections, as follows:
 - a. Water-Resistive Barriers: See Section 07 25 00 - Weather Barriers.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
 2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
 3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.

4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
5. Impact Resistant Safety Glass: Complies with ANSI Z97.1 - Class B, or 16 CFR 1201 - Category I criteria.

2.04 INSULATING GLASS UNITS

- A. Manufacturers:
 1. Basis of Design: Viracon, Apogee Enterprises, Inc: www.viracon.com/#sle.
- B. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
- C. Insulating Glass Units: Types as indicated.
 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 3. Warm-Edge Spacers: Low-conductivity thermoplastic with desiccant warm-edge technology design.
 - a. Spacer Width: As required for specified insulating glass unit.
 - b. Spacer Height: Manufacturer's standard.
 - c. Products:
 - 1) Quanex IG Systems, Inc; Super Spacer TriSeal: www.quanex.com/#sle.
 - 2) Technoform Glass Insulation; TGI-Spacer: www.glassinsulation.us/#sle.
 4. Spacer Color: Black.
 5. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
 6. Color: Black.
 7. Purge interpane space with dry air, hermetically sealed.
 8. Capillary Tubes: Provide tubes from air space for insulating glass units without inert type gas that have a change of altitude greater than 2500 feet between point of fabrication and point of installation to permit pressure equalization of air space.

- a. Capillary Tubes: Tubes to remain open and be of length and material type in accordance with insulating glass fabricator's requirements.
- D. Type IG-1 - Insulating Glass Units: Vision glass, double glazed. 1 inch thick
 - 1. Applications: Exterior glazing unless otherwise indicated.
 - 2. Space between lites filled with air; 1/2 inch
 - 3. Outboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum; HS VRE-46 #2
 - 4. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum. clear HS
 - 5. Total Thickness: 1 inch.
 - 6. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.27, nominal.
 - 7. Visible Light Transmittance (VLT): 43 percent, nominal.
 - 8. Shading Coefficient: 0.33, nominal.
 - 9. Solar Heat Gain Coefficient (SHGC): 0.29, nominal.
 - 10. Visible Light Reflectance, Outside: 0.34 percent, nominal.
 - 11. Glazing Method: Dry glazing method, gasket glazing.

2.05 GLAZING UNITS

- A. Type G-3 - Monolithic Safety Glazing: Non-fire-rated.
 - 1. Applications:
 - a. Glazed door lites, and fixed glass panel partitions
 - 2. Glass Type: Fully tempered safety glass as specified.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch, nominal.
 - 5. Glazing Method: Dry glazing method, gasket glazing.
- B. Type G-4 - Monolithic Safety Glazing: Non-fire-rated
 - 1. Applications:
 - a. Glazed between decorative tree panels - Children's Library
 - 2. Glass Type: Fully tempered safety glass as specified
 - 3. Tint: Clear

4. Thickness: 1/2 inch, nominal
5. Glazing Methods: Wet glazing method, sealant and sealant
6. Prepare glazing panels for indicated fittings and hardware before tempering
7. Temper glass materials horizontally. Visible tong marks or tong mark distortions are not permitted.

2.06 GLASS COATINGS

2.07 GLAZING COMPOUNDS

- A. Glazing Putty: Polymer modified latex, knife grade consistency; gray color.
- B. Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- C. Polyurethane Sealant: Single component, chemical curing, non-staining, non-bleeding; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; black color.
- D. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; _____ color.
- E. Manufacturers:
 1. Bostik Inc: www.bostik-us.com/#sle.
 2. Dow Corning Corporation: www.dowcorning.com/construction/#sle. Dow Corning Corporation: www.dowcorning.com/construction/#sle.
 3. Pecora Corporation: www.pecora.com/#sle.
 4. Tremco Commercial Sealants & Waterproofing; Proglaze: www.tremcosealants.com/#sle.

2.08 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

1. Width: As required for application.
 2. Thickness: As required for application.
 3. Spacer Rod Diameter: As required for application.
 4. Manufacturers:
 - a. Pecora Corporation; _____: www.pecora.com/#sle.
 - b. Tremco Global Sealants; _____: www.tremcosealants.com/#sle.
- D. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air barrier and vapor retarder seal; _____x_____ inch size.
1. Manufacturers:
 - a. Pecora Corporation; _____: www.pecora.com/#sle.
 - b. Saint-Gobain Performance Plastics; _____: www.plastics.saint-gobain.com/#sle.
- E. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
- F. Glazing channels: fixed glazed panel fittings sufficient to structurally support glazing under specified loads
1. General: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual"
 2. Provide surface mounted channels; extruded aluminum; mill finish; satin stainless steel clad
 3. Head Rail: 1 inch by 2 inches; C.R. Laurence "WU2BSCL", or equal
 4. Sill Rail: 1 inch by 1 inch: C.R. Laurance" WU3BSCL", or equal
 5. Anchors and Fastenings: Manufacturer's standard concealed anchors and fastenings. Do not use exposed fasteners.
 6. Sealant: One part silicone sealant, conforming to ASTM C920 clear.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.

- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - WET GLAZING METHOD (SEALANT AND SEALANT)

- A. Application - Interior Glazed: Set glazing infills from the interior of the building.
- B. Place setting blocks at 1/4 points and install glazing pane or unit.
- C. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
- D. Fill gaps between glazing and stops with manufacturer's required sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
- E. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.06 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.07 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove nonpermanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.08 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 09 05 61 - COMMON WORK RESULTS FOR FLOORING PREPARATION**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Carpet tile.
 - 3. Thin-set ceramic tile and stone tile.
- B. Removal of existing floor coverings.
- C. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- D. Testing of concrete floor slabs for moisture and alkalinity (pH).
- E. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- F. Patching compound.
- G. Remedial floor coatings.
- H. Remedial floor sheet membrane.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 01 74 19 - Construction Waste Management and Disposal: Handling of existing floor coverings removed.
- C. Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- D. Section 03 30 00 - Cast-In-Place Concrete: Moisture emission reducing curing and sealing compound for slabs to receive adhered flooring, to prevent moisture content-related flooring failures; to remain in place, not to be removed.
- E. Section 03 30 00 - Cast-In-Place Concrete: Concrete admixture for slabs to receive adhered flooring, to prevent moisture content-related flooring failures.

- F. Section 03 30 00 - Cast-In-Place Concrete: Limitations on curing requirements for new concrete floor slabs.

1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete; 2020.
- C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2022.
- D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.
- E. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

- A. CALGreen Submittals:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content.
- B. Visual Observation Report: For existing floor coverings to be removed.
- C. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- D. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
 - 1. Manufacturer's qualification statement.
 - 2. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
 - 3. Manufacturer's installation instructions.

4. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.
- E. Testing Agency's Report:
1. Description of areas tested; include floor plans and photographs if helpful.
 2. Summary of conditions encountered.
 3. Moisture and alkalinity (pH) test reports.
 4. Copies of specified test methods.
 5. Recommendations for remediation of unsatisfactory surfaces.
 6. Product data for recommended remedial coating.
 7. Submit report to Architect.
 8. Submit report not more than two business days after conclusion of testing.
- F. Adhesive Bond and Compatibility Test Report.
- G. Floor Moisture Testing Technician Certificate: International Concrete Repair Institute (ICRI) Concrete Slab Moisture Testing Technician- Grade I certificate.
- H. Copy of RFCI (RWP).

1.06 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Contractor may perform adhesive and bond test with Contractor's own personnel or hire a testing agency.
- C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- D. Contractor's Responsibility Relating to Independent Agency Testing:
 1. Provide access for and cooperate with testing agency.
 2. Confirm date of start of testing at least 10 days prior to actual start.
 3. Allow at least 4 business days on site for testing agency activities.
 4. Achieve and maintain specified ambient conditions.

5. Notify Architect when specified ambient conditions have been achieved and when testing will start.
- E. Floor Moisture Testing Technician Qualifications: International Concrete Repair Institute (ICRI) Concrete Slab Moisture Testing Technician Certification- Grade I.
- F. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Sustainable Material Requirements: Adhesives, sealants, and caulks used on the project shall conform to the VOC limits listed in Division 01 section "Sustainable Design Requirements".
- B. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to finish flush at edges.
 2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
 3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
 4. Products:

- a. H.B. Fuller Construction Products, Inc; TEC Feather Edge Skim Coat:
www.tecspecialty.com/#sle.
- C. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- D. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
 2. Products:
 - a. Allied Construction Technologies, Inc; _____: www.actechperforms.com/#sle.
 - b. ARDEX Engineered Cements; ARDEX VB 100: www.ardexamericas.com/#sle.
 - c. Custom Building Products; TechMVC Moisture Vapor and Alkalinity Barrier:
www.custombuildingproducts.com/#sle.
 - d. Floor Seal Technology, Inc; MES 100 with Floor Seal FloorCem SLU:
www.floorseal.com/#sle.
 - e. LATICRETE International, Inc; LATICRETE NXT Vapor Reduction Coating with LATICRETE NXT Level Plus: www.laticrete.com/#sle.
 - f. LATICRETE International, Inc; LATICRETE SUPERCAP Moisture Vapor Control with LATICRETE SUPERCAP Underlayment: www.laticrete.com/#sle.
 - g. Maxxon Corporation; Maxxon MVP One Primer: www.maxxon.com/#sle.
 - h. Proflex Products, Inc; Moisture Barrier 25 with DPU - Deep Pour Underlayment:
www.proflex.us/#sle.
 - i. Sika Corporation; Sikafloor Moisture Tolerance Epoxy Primer and Sikafloor Self-Leveling Moisture Tolerant Resurfacer: www.sikafloorusa.com/#sle.
 - j. Stauf USA, LLC; ERP-270 Perma-Seal: www.staufusa.com/#sle.
 - k. Tnemec Company, Inc; Series 208 Epoxoprime MVT: www.tnemec.com/#sle.
 - l. UZIN UTZ NORTH AMERICA, INC; UZIN PE 460 with UZIN PE 280 and UZIN NC 170 LevelStar: <https://us.uzin.com/#sle>.

PART 3 EXECUTION**3.01 CONCRETE SLAB PREPARATION**

- A. Follow recommendations of testing agency.
- B. Perform following operations in the order indicated:
 - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
 - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
 - b. Removal of existing floor covering.
 - 2. Existing concrete slabs with coatings or penetrating sealers/hardeners/dustproofers:
 - a. Do not attempt to remove coating or penetrating material.
 - b. Do not abrade surface.
 - 3. Preliminary cleaning.
 - 4. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
 - 5. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 6. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 7. Specified remediation, if required.
 - 8. Patching, smoothing, and leveling, as required.
 - 9. Other preparation specified.
 - 10. Adhesive bond and compatibility test.
 - 11. Protection.
- C. Remediations:
 - 1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
 - 2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.

3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI (RWP), as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.03 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
- F. Report: Report the information required by the test method.

3.05 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.

- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.06 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.07 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with recommendations of testing agency.
- C. Comply with requirements and recommendations of floor covering manufacturer.
- D. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- E. Do not fill expansion joints, isolation joints, or other moving joints.

3.08 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.09 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.10 APPLICATION OF REMEDIAL FLOOR TREATMENT

- A. Comply with requirements and recommendations of treatment manufacturer.

3.11 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 29 00 - GYPSUM BOARD**PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
1. Interior Gypsum Board:
 2. Tile backing panels for wall tile.
 3. Metal trim accessories, auxiliary materials, joint treatment, corner guards and skim-coating.
- B. Related Requirements:
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
 2. Section 01 74 19 – Construction Waste Management and Disposal .
 - 3.
 4. Section 06 10 00 "Rough Carpentry" for wood framing that supports gypsum board panels.
 5. Section 07 21 00 "Building Insulation" for insulation installed in gypsum board assemblies.
 6. Section 07 92 00 "Joint Sealants" for acoustical sealants installed in gypsum board assemblies.
 7. Section 09 90 00 "Painting" for primers and topcoats applied to gypsum board surfaces.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. CALGreen Submittals:
1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
- C. Samples: For the following products:
1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.03 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.

1.04 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, 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, 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.

PART 2 - PRODUCTS**2.01 GYPSUM BOARD, GENERAL**

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Adhesives and Sealants.
- B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.02 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Georgia-Pacific Building Products.
 - 2. National Gypsum Company.
 - 3. PABCO Gypsum.
 - 4. Temple-Inland Building Products by Georgia-Pacific.
 - 5. United States Gypsum Company.

6. Equal.
- C. Gypsum WallBoard:
1. Core: 5/8 inch or as required to flush with adjacent finishes.
 2. Long Edges: Tapered.

2.03 TILE BACKING PANELS FOR WALL TILE

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corporation; "GlasRoc Tile Backer."
 - b. Georgia-Pacific Building Products; "DensShield Tile Backer."
 - c. Temple-Inland Building Products by Georgia-Pacific; "GreenGlass Tile Backer"
 - d. Equal.
 2. Core: 5/8 inch.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.04 METAL TRIM ACCESSORIES

- A. Typical Interior Trim: ASTM C 1047.
1. Material: Screw-attached, galvanized or aluminum-coated steel sheet. No paper-faced trim products are acceptable.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion joint for 1/2" gap
 - d. Square-Edge Cornerbead: With notched or flexible flanges.

2.05 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
1. Interior Gypsum Board: Paper.
 2. Tile Backing Panels: As recommended by panel manufacturer.

- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.06 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.
- C. 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 thick.
- D. Insulation: As specified in Section 07 21 00 "Building Insulation."
- E. Acoustical Sealant: As specified in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- 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.

3.02 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except long edges at right angles to framing and in applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.03 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Paper faced gypsum panels: Throughout, unless otherwise indicated.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.

2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws. Do not penetrate board face with screw heads.

3.04 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Tile Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile, and non-wet locations as indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.05 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. No "mudded-in" trim accessories are acceptable.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Typical Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners unless otherwise indicated.
 2. LC-Bead: Use at exposed panel edges.

3.06 FINISHING GYPSUM BOARD

- A. A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 1. Level 0: In areas of temporary construction.

2. Fire Tape Only: Ceiling plenum areas, concealed areas, and where indicated.
 3. Level 2: Panels that are substrate for tile.
 4. Level 3: Panels that are substrate for wood wall panels and fabric-wrapped wall panels.
 5. Level 4: At panel surfaces in “back-of-house” areas not visible to the public, including staff areas, mechanical spaces, storage rooms, and similar spaces, but excluding panel surfaces that are scheduled to receive paints with semi-gloss or gloss sheen.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
 6. Level 5: At panel surfaces that will be exposed to view unless otherwise indicated; at panel surfaces that are scheduled to receive paints with semi-gloss or gloss sheen; and where otherwise indicated on Drawings.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Tile Backing Panels: Finish according to manufacturer's written instructions.
1. 1. Where exposed, finish according to manufacturer's written instructions for use as exposed board.

3.07 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 09 29 00

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SECTION 09 30 00 - TILING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Ceramic accessories.
- D. Ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.
- D. Division 22: Plumbing systems and fixtures

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2019.
- B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017.
- C. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2017.
- D. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2021).
- E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2019.
- F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2021.
- G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 1999 (Reaffirmed 2019).

- H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2019).
- I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2019).
- J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017.
- K. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2019).
- L. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2021).
- M. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.
- N. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2019.
- O. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2019.
- P. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.
- Q. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2014 (Reaffirmed 2019).
- R. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).
- S. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2019.
- T. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.
- U. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).
- V. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2018.
- W. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

- X. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2022.
- Y. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2022.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
 - 2. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Setting and Grouting Systems: Indicate TCNA installation system for each type of tile and setting assembly.
- E. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Installer's Qualification Statement:
 - 1. Submit documentation of completion of apprenticeship and certification programs.
- H. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Tile: 1 percent of each size, color, and surface finish combination.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of ANSI A108/A118/A136 and TCNA (HB) on site.
- B. Installer Qualifications:

1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

- A. Manufacturers:
 1. Basis of Design: Crossville: www.crossville.com.
 2. or equal.
- B. Glazed Wall Tile, Type CT-1: ANSI A137.1 standard grade.
 1. Moisture Absorption: <20.0% percent as tested in accordance with ASTM C373.
 2. Size: 3"X12", nominal.
 3. Surface Finish: Gloss
 4. Color(s): Unscripted HWR01.
 5. Pattern: Vertical Stacked.
 6. Trim: Schluter Systems as indicated in the drawings.
 7. Trim Units: Matching bullnose shapes in sizes coordinated with field tile.
 8. Products:
 - a. Crossville Corporation; Handwritten: www.crossville.com
- C. Glazed Wall Tile, Type[CT-2]: ANSI A137.1 standard grade.
 1. Moisture Absorption: [<20.0%] percent as tested in accordance with ASTM C373.
 2. Size: 3"X12", nominal.
 3. Surface Finish: [Gloss]

4. Color(s): [Penpal HWR06].
 5. Pattern: [Vertic].
 6. Trim: Schluter Systems as indicated in the drawings.
 7. Trim Units: Matching bullnose shapes in sizes coordinated with field tile.
 8. Products:
 - a. Crossville Corporation;[Handwritten]: www.crossville.com
- D. Glazed Wall Tile, Type[CT-3]: ANSI A137.1 standard grade.
1. Moisture Absorption: [<20.0%] percent as tested in accordance with ASTM C373.
 2. Size: 3"X12", nominal.
 3. Surface Finish: [Gloss]
 4. Color(s): [Dear Sir HWR04].
 5. Pattern: [Vertical Stacked].
 6. Trim: Schluter Systems as indicated in the drawings.
 7. Trim Units: Matching bullnose shapes in sizes coordinated with field tile.
 8. Products:
 - a.
- E. Porcelain Stone Textured, Type CT-1: ANSI A137.1 standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 2. Size: 12 in by 24 in inch, nominal.
 3. Thickness: 5/16 inch.
 4. Surface Finish: Matte
 5. Color(s): WW02; Drift
 6. Pattern: Running bond.
 7. Products:
 - a. Dal-Tile Corporation; Wanderwise: www.daltile.com/#sle.

2.02 TRIM AND ACCESSORIES

- A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
- B. Non-Ceramic Trim: Satin Nickel Anodized Aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
 - 1. Applications:
 - a. Thresholds at door openings.
 - b. Floor to wall joints.
 - 2. Manufacturers:
 - a. Schluter-Systems: www.schluter.com/#sle.

2.03 SETTING MATERIALS

- A. Manufacturers:
 - 1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
 - 2. Custom Building Products: www.custombuildingproducts.com/#sle.
 - 3. LATICRETE International, Inc: www.laticrete.com/#sle.
 - 4. or equal.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
 - 1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
 - 2. Products:
 - a. ARDEX Engineered Cements; ARDEX X 5: www.ardexamericas.com/#sle.
 - b. Custom Building Products; ProLite Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer: www.custombuildingproducts.com/#sle.
 - c. LATICRETE International, Inc[<>]: www.laticrete.com/#sle.
 - d. or equal.

2.04 GROUTS

- A. Manufacturers:
 - 1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.

2. Custom Building Products; _____: www.custombuildingproducts.com/#sle.
 3. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout:
www.laticrete.com/#sle.
- B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Use this type of grout at walls and where no other type of grout is indicated.
 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
 3. Color(s): As selected by Architect from manufacturer's full line.
 4. Products:
 - a. ARDEX Engineered Cements; ARDEX FL: www.ardexamericas.com/#sle.
 - b. Custom Building Products; Prism Color Consistent Grout:
www.custombuildingproducts.com/#sle.
 - c. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout:
www.laticrete.com/#sle.
- C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Applications: Where indicated at floors.
 2. Color(s): As selected by Architect from manufacturer's full line.
 3. Products:
 - a. ARDEX Engineered Cements; ARDEX WA: www.ardexamericas.com/#sle.
 - b. Custom Building Products; CEG-IG 100% Solids Industrial Grade Epoxy Grout:
www.custombuildingproducts.com/#sle.
 - c. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com/#sle.

2.05 MAINTENANCE MATERIALS

- A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
1. Applications: Between tile and plumbing fixtures.
 2. Color(s): As selected by Architect from manufacturer's full line.
 3. Products:

- a. ARDEX Engineered Cements; ARDEX SX: www.ardexamericas.com/#sle.
 - b. Custom Building Products; Commercial 100% Silicone Caulk: www.custombuildingproducts.com/#sle.
 - c. LATICRETE International, Inc; LATICRETE LATASIL: www.laticrete.com/#sle.
- B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
- 1. Composition: Water-based colorless silicone.
 - 2. Color(s): As selected by Architect from manufacturer's full line.
 - 3. Products:
 - a. Merkrete, by Parex USA, Inc; Merkrete Revive: www.merkrete.com/#sle.

2.06 ACCESSORY MATERIALS

- A. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
- 1. Crack Resistance: No failure at 1/16 inch gap, minimum; comply with ANSI A118.12.
 - 2. Fluid or Trowel Applied Type:
 - a. Material: Synthetic rubber or Acrylic.
 - b. Thickness: 25 mils, minimum, dry film thickness.
 - c. Products:
 - 1) ARDEX Engineered Cements; ARDEX 8+9: www.ardexamericas.com/#sle.
 - 2) Custom Building Products; RedGard Crack Prevention and Waterproofing Membrane: www.custombuildingproducts.com/#sle.
 - 3) LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com/#sle.
- B. Backer Board: See Section 09 21 16 - Gypsum Board Assemblies. Coated glass mat type complying with ASTM C1178/C1178Minorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.
- C. Mesh Tape: 2 inch wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- B. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- C. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install backer board in accordance with Section 09 21 16 - Gypsum Board Assemblies.

3.03 INSTALLATION - GENERAL

- A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed or with metal trim as detailed.
- F. Install ceramic accessories rigidly in prepared openings.
- G. Install non-ceramic trim in accordance with manufacturer's instructions.
- H. Keep control and expansion joints free of mortar, grout, and adhesive.
- I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
 - 1. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.
- B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.

3.05 INSTALLATION - WALL TILE

- A. Grout with standard grout as specified above. Sealed with grout sealer as recommended by grout manufacturer
- B. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 51 00 - ACOUSTICAL CEILINGS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system. Match existing
- B. Acoustical units. Match existing

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 74 19 - Construction Waste Management and Disposal.
- C. Section 01 81 13 - Sustainable Design Requirements.
- D. Division 21: Sprinkler heads in acoustical ceilings.
- E. Division 23: Grilles, registers, and diffusers in acoustical ceilings.
- F. Division 26: Lighting fixtures in acoustical ceilings.
- G. Division 28: Fire alarm components in ceiling system.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2022.
- C. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.
- D. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.
- E. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2022.
- F. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2022.
- G. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

1.04 [REGULATORY REQUIREMENTS]

- A. **[Suspended ceiling system shall be provided and installed in accordance with the California Building Code (CBC) and current edition of California Division of the State**

Architect publication DSA IR 25.2 - Metal Suspension Systems for Lay-In Panel Ceiling.]**1.05 ADMINISTRATIVE REQUIREMENTS**

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.06 INFORMATIONAL SUBMITTALS

- A. CALGreen Submittals: Provide product data for the following:
 - 1. Product Data for CALGreen 5.504.4.1 - Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- C. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type.

1.07 ACTION SUBMITTALS

- A. Shop Drawings: Submit reflected ceiling plans on which the following items are shown and coordinated with each other for the fabrication and installation of the Work, based on input from installers of the items involved for Architect's action.
 - 1. Layout of suspension systems, location of hangers, seismic braces and trapezes.
 - 2. Hanger spacing and fastening details.
 - 3. Trapeze details.
 - 4. Splicing method for main and cross runners.
 - 5. Method of attaching hangers to building structure.
 - 6. Support at ceiling fixtures and air diffusers.
 - 7. Change in level details.
 - 8. Seismic control details.
 - 9. Moldings.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved. Develop and coordinate location of all Work which is to be located in ceiling prior

to making shop drawing submittal.:

1. Ceiling suspension system and bracing.
 2. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, and their bracing.
 3. Access panels.
- C. Product Data: Provide data on suspension system components and acoustical units, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Accessories.
- D. Samples:
1. Acoustical Units: Submit two samples 6 by 6 inch in size illustrating material and finish of acoustical units.
 2. Suspension System Components: Submit two samples each, 12 inches long, of suspension system main runner, cross runner, and perimeter molding.
- E. Manufacturer's Installation Instructions: Indicate general and special procedures and perimeter conditions requiring special attention.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Acoustical Units: 10 sq ft of each type and size.

1.08 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E1264 for Class A materials as determined by testing identical products per ASTM E84:
 2. Smoke-Developed Index: 450 or less.
- C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to requirements of authorities having jurisdiction.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

PART 2 PRODUCTS**2.01 MATERIAL REQUIREMENTS, GENERAL**

- A. Recycled Content: Provide products made from steel sheet with average recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- B. VOC Content: Sealants applied on-site on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 01 81 13 - Sustainable Design Requirements.

2.02 MANUFACTURERS

- A. Acoustic Tiles/Panels: The design for the acoustical panel ceiling systems is based on the manufacturer identified below. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 - 1. Basis of Design: Armstrong World Industries, Inc: www.armstrongceilings.com/#sle.
 - 2. CertainTeed Corporation: www.certainteed.com/#sle.
 - 3. USG Corporation: www.usg.com/ceilings/#sle.
- B. Suspension Systems:
 - 1. Same as for acoustical units.

2.03 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design Category D and complying with the following:
 - 1. ICC-ES Evaluation Report No. ESR - 1308.
- B. Fire Performance: Class A: ASTM E84. Flame Spread Index of 25 or less. Smoke Developed Index of 50 or less

2.04 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
1. VOC Content: Certified as Low Emission by one of the following:
 - a. Product listing in UL (GGG).
- B. Acoustical Panels, Type ACT-1: Painted mineral fiber, with the following characteristics:
1. Classification: ASTM E1264 Type III.
 - a. Form: 2, water felted.
 - b. Pattern: "C" - perforated, small holes.
 2. Size: 24 by 24 inches.
 3. Thickness: 5/8 inches.
 4. Fire Rating: Class A
 - a. Flame Spread: 25 or less.
 - b. Smoke Developed: 50 or less
 5. Light Reflectance: 0.80 percent, determined in accordance with ASTM E1264.
 6. NRC Range: 0.55, determined in accordance with ASTM E1264.
 7. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
 8. Panel Edge: Angled Tegular, for nominal 15/16 inch grid
 9. Color: White.
 10. Suspension System Type Prelude 15/16" XL : Exposed grid.
 11. Recycled Content: 34%.
 12. Products: Contractor to field verify existing acoustical panels type, pattern, edge, and dimension and match existing.
 - a. Armstrong World Industries, Inc; Cortega: www.armstrongceilings.com/#sle.
 - b. Armstrong World Industries, Inc; Fine Fissured: www.armstrongceilings.com/#sle.

2.05 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with hold down clips, stabilizer bars, clips, and splices as required.
1. Materials:

- a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
- B. Exposed Suspension System: Hot-dipped galvanized steel grid with aluminum cap.
 1. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.
 2. Profile: Tee; 15/16 inch face width.
 3. Finish: Baked enamel.
 4. Color: White.
 5. Products:
 - a. USG Corporation; Donn DX : www.usg.com/ceilings/#sle.
 - b. Armstrong World Industries Inc., Prelude XL
 - 1) Main Runners: #7301, 15/16-inch flange, 1-11/16-inch high, double web construction.
 - 2) Cross Runners: 15/16-inch flange, double web construction.

2.06 ACCESSORIES

- A. Attachment Devices: Size for 5 times design load indicated in ASTM C635, Table 1, Direct Hung, double web, Heavy-Duty System, unless otherwise indicated.
- B. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
 1. Hanger Wires: Connection device capable of carrying not less than 100-pounds.
 2. Bracing Wires: Connection device capable of carrying not less than 200-pounds or the actual design load, whichever is greater, with a safety factor of 2 without yielding.
 3. Provide not less than 0.106-inch diameter (12-gage).
- C. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper.
 1. Gage: Provide wire sized so that stress at 3 times hanger design load (ASTM C635, Table 1, Direct-Hung) will be less than yield stress of wire.
 2. Provide not less than 0.106-inch diameter (12-gage).
- D. Hold-Down Clips: Manufacturer's standard clips designed for compatibility with specified grid systems; where indicated, provide manufacturer's standard hold-down clips spaced 24-inches (610 mm) oc on all cross tees.
- E. Seismic Clips: Manufacturer's standard clips for seismic conditions and to suit application.

- F. Perimeter Moldings: Same metal and finish as grid. : Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
1. Size: As required for installation conditions and specified Seismic Design Category.
 2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
 3. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.

2.07 ACOUSTICAL SEALANT

- A. Refer to Section 01 81 13 - Sustainable Design Requirements for requirements for low-emitting materials for adhesives, sealants, and caulks used on the project.
- B. Acceptable Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
 2. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, non-hardening, non-skinning, nonstaining, gunnable, synthetic-rubber sealant, recommended for sealing interior concealed joints to reduce airborne sound transmission.
 - a. Pecora Corporation; BA-98.
 - b. Tremco, Inc.; Tremco Acoustical Sealant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

- C. Verify that layout of hangers will not interfere with other work. Make adjustments in layout as necessary.

3.02 SUSPENDED CEILING SYSTEM

- A. Install acoustical material and suspension system, including necessary hangers and other supporting hardware in accordance with manufacturer's instructions and ASTM C636.
- B. Lay work out symmetrically about centers of rooms and provide symmetrical borders not less than half size of tile specified unless noted otherwise on the Drawings.
- C. Install after major above-ceiling work is complete.
- D. Coordinate the location of hangers with other work.
- E. Make penetrations through ceiling panels in such a manner to ensure tight fit and neat appearance. Center penetrations in tile unless otherwise noted.

3.03 FIELD QUALITY CONTROL

- A. Acoustical Ceiling Connection Devices: Test devices for capability to support the following loads:
 - 1. Hanger Wires: 100 pounds in accordance with requirements of CBC.
 - 2. Lateral Force Bracing Wires: 200 pounds or actual design load whichever is greater, with safety factor of 2, in accordance with CBC.

3.04 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M and ASTM E580/E580M as shown on drawings and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Install in bed of acoustical sealant.
 - 2. Use longest practical lengths.
- D. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers to span the extra distance.
- E. Support fixture loads using supplementary hangers located at each corner, or support components independently. Provide hanger wire supports for all recessed light fixtures and mechanical items as required for total support independent of acoustical ceiling systems
- F. Do not eccentrically load system or induce rotation of runners.

- G. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

3.05 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
 - 1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
- C. Lay directional patterned units with pattern orientation as indicated on drawings.
- D. Fit border trim neatly against abutting surfaces.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.
- H. Lay acoustical insulation for a minimum distance of 48 inches either side of acoustical partitions as indicated.
- I. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements. Space clips as recommended by panel manufacturer's written instructions, unless otherwise indicated or required by Authority Having Jurisdiction.
- J. Install hold-down clips on panels within 20 ft of an exterior door.

3.06 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.07 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- B. Construction Waste Management: Manage construction waste in accordance with provisions of Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION

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SECTION 09 65 00 - RESILIENT FLOORING & BASE**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Resilient sheet flooring.
- B. Resilient base.
- C. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section .01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials and floor finish materials.
- C. Section 03 30 00 - Cast-In-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.
- D. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.
- E. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.
- F. Division 26: Grounding and bonding of static control flooring to building grounding system.
- G. Division 26: Electrical floor cover plates for installation of resilient flooring specified in this section.

1.03 REFERENCE STANDARDS

- A. ASTM D6866 - Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).
- C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.
- D. ASTM F2034 - Standard Specification for Sheet Linoleum Floor Covering; 2018.
- E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.
- F. RFCI - Resilient Floor Covering Institute FloorScore Program

1.04 SUBMITTALS

- A. See Division 01 for submittal procedures.
- B. CALGreen Submittals:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content.
 - 2. Product Data for CALGreen 5.504.4.6 – Finish Material Pollutant Control; Resilient Flooring Systems: For resilient tile flooring, documentation indicating certification under the Resilient Floor Covering Institute (RFCI) FloorScore program.
- C. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- D. Shop Drawings: Indicate seaming plans and floor patterns.
- E. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient flooring product specified.
- F. Sustainable Design Submittal: Submit VOC content documentation for flooring and adhesives.
- G. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- H. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- I. Manufacturer's Qualification Statement.
- J. Installer's Qualification Statement.
- K. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- L. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Flooring Material: 100 square feet of each type and color.
 - 2. Extra Wall Base: 50 linear feet of each type and color.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

1.07 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS**2.01 MATERIAL REQUIREMENTS, GENERAL**

- A. Resilient flooring systems. For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following :
 - 1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
 - 2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
 - 3. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database; or
 - 4. Products certified under the UL GREENGUARD Gold (formerly the Greenguard Children & Schools program).
- B. Adhesives: All leveling compounds, adhesives and sealers shall meet the requirements of Table 5.504.4.1.
- C. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for floor finishes and low-emitting materials.

2.02 SHEET FLOORING

- A. Linoleum Sheet Flooring - Type RES: Homogeneous wear layer bonded to backing, with color and pattern through wear layer thickness.
 - 1. Manufacturers:

- a. Forbo Flooring, Inc; Marmoleum Cocoa: www.forboflooringna.com/#sle.
 - 2. Minimum Requirements: Comply with ASTM F2034, Type corresponding to type specified.
 - 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 4. Backing: Jute fabric.
 - 5. Thickness: 0.100 inch, minimum, excluding backing.
 - 6. Sheet Width: 79 inch, minimum.
 - 7. Seams: Heat welded.
 - 8. Pattern: Solid color.
 - 9. Color: Chocolate Blues.
- B. Welding Rod: Solid bead in material compatible with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

2.03 RESILIENT BASE

- A. Resilient Base - RB: ASTM F1861, Type TS, rubber, vulcanized thermoset; style as scheduled.
- 1. Manufacturers:
 - a. Roppe Corporation; [Pinnacle Rubber Wall Base]: www.roppe.com/#sle.
 - b. Johnsonite, a Tarkett Company; _____: www.johnsonite.com/#sle.
 - c. Mannington Commercial; _____: www.manningtoncommercial.com/#sle.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 3. Height: 6 inches.
 - 4. Thickness: 0.125 inch.
 - 5. Profile: Standard Toe
 - 6. Finish: Satin.
 - 7. Length: Roll.
 - 8. Color: 193 Black Brown.
 - 9. Accessories: Premolded external corners and internal corners.

2.04 ACCESSORIES

- A. Subfloor Filler: Type recommended by flooring material manufacturer and in accordance with Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
 - 1. VOC Content Limits: As specified in Section 01 81 13 - Sustainable Design Requirements.
- C. Moldings, Transition and Edge Strips: Same material as flooring.
 - 1. Manufacturers:
 - a. Roppe Corporation; www.roppe.com/#sle
 - b. Mannington Commercial; _____: www.manningtoncommercial.com/#sle.
 - c. Johnsonite, a Tarkett Company; [_____]: www.johnsonite.com/#sle. ____.
- D. Floor Polish for Static Control Flooring: Fluid-applied polish, intended to protect electrical properties of flooring, as recommended by static control flooring manufacturer.
- E. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test in accordance with Section 09 05 61 - Common Work Results for Flooring Preparation
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
 - 3. Follow moisture and alkalinity remediation procedures in Section 09 05 61 - Common Work Results for Flooring Preparation.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61 - Common Work Results for Flooring Preparation.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.
- D. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- E. Install flooring in recessed floor access covers, maintaining floor pattern.
- F. At movable partitions, install flooring under partitions without interrupting floor pattern.
- G. Install feature strips where indicated.

3.04 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Seams are prohibited in bathrooms, kitchens, toilet rooms, and custodial closets.
- C. Cut sheet at seams in accordance with manufacturer's instructions.
- D. Seal seams by heat welding where indicated.

3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.

- B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

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SECTION 09 68 13 - TILE CARPETING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Carpet tile, fully adhered.
- B. Removal of existing carpet tile.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements.
- C. Section 01 74 19 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap and removed carpet tile.
- D. Section 03 30 00 - Cast-In-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied flooring.
- E. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.
- F. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.
- G. Section 09 65 00 - Resilient Flooring & Base.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).
- B. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Current Edition.
- C. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.04 SUBMITTALS

- A. CALGreen Submittals:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content.
 - 2. Product Data for CALGreen 5.504.4.4 – Finish Material Pollutant Control; Carpet Systems: For carpet tile, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.

- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate layout of joints.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Submit two, 4 inch long samples of edge strip.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- H. Manufacturer's Qualification Statement.
- I. Installer's Qualification Statement.
- J. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tile Carpeting:
 - 1. Basis of Design: Tarkett Group, Inc: www.tarkett-group.com/#sle. or equal

2.02 SUSTAINABLE MATERIAL REQUIREMENTS

- A. Recycled Content: Provide carpet tile products with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less

than 45 percent.

- B. Carpet systems: All carpet installed in the building interior shall meet at least one of the testing and product rating requirements for Low-Emitting Materials listed in Section 01 81 13 - Sustainable Design Requirements.
- C. Carpet adhesive. All carpet adhesive shall conform to the VOC limits listed in Section 01 81 13 - Sustainable Design Requirements.

2.03 MATERIALS

- A. Tile Carpeting, Type CPT-1: Tufted, manufactured in one color dye lot.
 - 1. Product: Garbadine manufactured by Tarkett.
 - 2. Tile Size: 24 inch by 24 inch, nominal.
 - 3. Thickness: 0.185" inch.
 - 4. Color: Prairie Wind 77209.
 - 5. Pattern type/Pattern: Geometric; Garbadine 11511.
 - 6. Installation: Glue-Down; Vertical Ashlar
 - 7. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 - 8. Smoke Density: 450 or less ; ASTM E662
 - 9. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
 - 10. Gauge: 5/64 inch.
 - 11. Stitches/Rows per Inch: 9.6 per inch.
 - 12. Density Factor: 10,400 oz/ cu yd
 - 13. Primary Backing Material: Synthetic Non-Woven.
 - 14. Secondary Backing Material: Modular Flex Aire Cushion.
- B. Tile Carpeting, Type[CPT-2]: Tufted, manufactured in one color dye lot.
 - 1. Product: [Sweater Knit] manufactured by [Tarkett].
 - 2. Tile Size: 24 inch by 24 inch, nominal.
 - 3. Pile Thickness: [0.155] inch. ASTM D5848
 - 4. Color: [Prairie Wind 77209]

5. Pattern type/ Pattern: [Geometric; Sweaterknit G0045].
 6. Installation: Glue-Down; Vertical Ashlar
 7. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253. Class 1
 8. Smoke Density: 450 or less ; ASTM E662
 9. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable. GLP8320
 10. Gauge: [1/10] inch,
 11. Stitches/Rows per Inch: [8] per inch
 12. Pile Density: [80 oz/ cu yd]
 13. Primary Backing Material: [Synthetic Non-Woven].
 14. Secondary Backing Material: [ethos Modular with Omniccoat Technology].
- C. Tile Carpeting, Type[CPT-3]
1. Product: [Abrasive Action II] manufactured by [Tarkett].
 2. Tile Size: 24 inch by 24 inch, nominal.
 3. Pile Thickness: [0.115] inch.ISO 1766
 4. Color: [Winter Gray]
 5. Pattern type/ Pattern: [Texture; Abrasive Action II 02578].
 6. Installation: Glue-Down; Monolithic
 7. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253. Class 1
 8. Smoke Density: 450 or less ; ASTM E662
 9. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable. GLP8320
 10. Gauge: [1/12] inch,
 11. Stitches/Rows per Inch: [8] per inch
 12. Pile Density: [96 oz/ cu yd]; ISO 8543
 13. Primary Backing Material: [Synthetic Non-Woven].
 14. Secondary Backing Material: [Modular ethos with Omniccoat Technoloty].

2.04 ACCESSORIES

- A. Subfloor Filler: Type recommended by flooring material manufacturer and in accordance with Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Edge Strips: Rubber, color as selected by Architect.
- C. Adhesives:
 - 1. Compatible with materials being adhered; maximum VOC content as specified in Section 01 81 13 - Sustainable Design Requirements.
 - 2. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test in accordance with Section 09 05 61 - Common Work Results for Flooring Preparation.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
 - 3. Follow moisture and alkalinity remediation procedures in Section 09 05 61 - Common Work Results for Flooring Preparation.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove existing carpet tile.
- B. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61 - Common Work Results for Flooring Preparation.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.

- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Run carpet into recessed areas such as the open kneespace below counters and work surfaces.
- G. Locate change of color or pattern between rooms under door centerline.
- H. Fully adhere carpet tile to substrate.
- I. Trim carpet tile neatly at walls and around interruptions.
- J. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 90 00 - PAINTING AND COATING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation and field painting of exposed existing and new interior items and surfaces.
- B. Surface preparation and field painting of exposed exterior items and surfaces.
- C. Painting of exposed bare and covered pipes and ducts, hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- C. Section 05 50 00 - Metal Fabrications: Shop finishing of metal fabrications.
- D. Section 06 20 00 - Finish Carpentry: Shop priming architectural woodwork.
- E. Section 07 92 00 - Joint Sealants.
- F. Section 08 11 13 - Hollow Metal Doors and Frames: Factory priming of doors and frames.
- G. Section 08 14 16 - Flush Wood Doors: Factory finishing of flush wood doors.
- H. Section 09 21 16 - Gypsum Board Assemblies: Gypsum board finish levels.

1.03 DEFINITIONS

- A. General: Paint includes coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats. Standard coating terms are defined in ASTM D16.
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85 degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60 degree meter.
 - 3. Semi-Gloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60 degree meter.
 - 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60 degree meter.

- B. Environments: The following terms distinguish between different corrosive exposures:
1. "Severe environments" are highly corrosive industrial atmospheres with sustained exposure to high humidity and condensation and with frequent cleaning using strong chemicals. Environments with heavy concentrations of strong chemical fumes and frequent splashing and spilling of harsh chemical products are severe environments.
 2. "Moderate environments" are corrosive industrial atmospheres with intermittent exposure to high humidity and condensation, occasional mold and mildew development, and regular cleaning with strong chemicals. Environments with exposure to heavy concentrations of chemical fumes and occasional splashing and spilling of chemical products are moderate environments.
 3. "Mild environments" are industrial atmospheres with normal exposure to moderate humidity and condensation, occasional mold and mildew development, and infrequent cleaning with strong chemicals. Environments with low levels of mild chemical fumes and occasional splashing and spilling of chemical products are mild environments. Normal outdoor weathering is also considered a mild environment.

1.04 REFERENCE STANDARDS

1.05 SYSTEM DESCRIPTION

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2019.
- B. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2; 2017.
- C. EN 15804 - Sustainability of Construction Works - Environmental Product Declarations - Core Rules for the Product Category of Construction Products; 2022 (Corrigendum 2021).
- D. GreenSeal GS-11 - Paints, Coatings, Stains, and Sealers; 2015.
- E. ISO 14025 - Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures; 2006.
- F. ISO 14040 - Environmental Management - Life Cycle Assessment - Principles and Framework; 2006, with Amendment (2020).
- G. ISO 14044 - Environmental Management - Life Cycle Assessment - Requirements and Guidelines; 2006, with Amendment (2020).
- H. ISO 21930 - Sustainability in Buildings and Civil Engineering Works — Core Rules for Environmental Product Declarations of Construction Products and Services; 2017.
- I. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- J. SSPC-SP 10 - Near-White Metal Wet Abrasive Blast Cleaning; 2015.

1.06 SUBMITTALS

- A. CALGreen Submittals:
1. Product Data for CALGreen 5.504.4.3 - Finish Material Pollutant Control, Paints and Coatings: Product data and material safety data sheets (MSDS) for coatings, including printed statement of chemical composition and VOC content of each product used.
 2. Aerosol paints and coatings. Aerosol paints and coatings shall meet the PWMIR Limits for VOC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of California Code of Regulations, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.
 3. Field Verification of on-site product containers: If required by Authority Having Jurisdiction.
- B. Product Data: For each paint system indicated, including:
1. Material List: An inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 2. Preparation instructions and recommendations.
 3. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- C. Verification Samples: For each finish product specified, two samples, minimum size 8 inch square, representing actual product, color, and patterns.
1. Step coats on Samples to show each coat required for system.
 2. Label each coat of each Sample.
 3. Label each Sample for location and application area.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this project, whose work has resulted in applications with a record of successful in-service performance.
- B. Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.
- C. Paint exposed surfaces. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

- D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
- E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect. Simulate finished lighting conditions for review of in-place work.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Final colors to be approved by the Architect after a maximum of 3 adjustments to each color at no additional cost. Refinish mock-up area as required to produce acceptable work.
 - 4. Wood specified to receive stain finishes: Provide samples on full width boards at least 8 ft. in length. Apply over prepared surface utilizing proposed application method. Final color to be approved by the Architect after a maximum of 2 adjustments at no additional cost.
 - 5. Wall surfaces: Provide sample area of at least 100 sq. ft in area. Apply over specified undercoat utilizing proposed application method for each type of finish.
 - 6. Existing Wallcovering surfaces: Provide sample area of at least 100 sq. ft in area. Coordinate location of sample area for review of proposed application.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F. Maintain storage containers in a clean condition, free of foreign materials and residue.

1.09 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 degrees F and 90 degrees F.
- C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 degrees F and 95 degrees F.
- D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.10 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
- B. Quantity: Furnish Owner with an additional three percent, but not less than 1 gallon or 1 case, as appropriate, of each material and color applied.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer: PPG Paints, 400 Bertha Lamme Drive Cranberry, PA 16066. Toll Free Tel: 888-PPG-IDEA. Web: www.ppgpaints.com/#sle.
- B. Other Acceptable Manufacturers:
 1. Dunn Edwards.

2.02 PAINT MATERIALS - GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. VOC Classification: Provide high-performance coating materials, including primers, undercoats, and finish-coat materials, that meet the applicable local, state or federal VOC requirements.
 1. Comply with all product VOC levels specified in this Section that are more stringent than regulatory requirements.
- C. CalGreen Coating VOC Limits: Refer to Section 01 81 13 - Sustainable Design Requirements.
- D. Color: Refer to Drawings for paint sheen and color.

2.03 INTERIOR PRIMERS

- A. Interior Gypsum Board Primer: Factory-formulated, low VOC latex-based primer for interior application.
 1. PPG Paints; 6-4900XI Speedhide zero Interior Zero VOC Latex Sealer (0 g/L VOC).
 - a. Applied at a dry film thickness of not less than 1.2 mils.

2. Dunn Edwards; UGSL00-Ultra-Grip Select Interior Zero VOC Multi-Surface Primer (3 g/l VOC).
- B. Interior Wood Primer: Factory-formulated, low VOC latex-based interior wood primer.
1. PPG Paints; 6-4900XI Speedhide zero Interior Zero VOC Latex Sealer (0 g/L VOC).
 - a. Applied at a dry film thickness of not less than 1.2 mils.
 2. Dunn Edwards; UGSL00-Ultra-Grip Select Ultra Grip Select- Multi Surface Primer (3 g/l VOC).
- C. Interior Ferrous, Non-Ferrous, Galvanized Metal, and Aluminum Primer: Factory-formulated waterborne acrylic rust-inhibitive metal primer.
1. PPG Paints; 4020 PF Series Pitt-Tech Plus Interior/Exterior DTM Industrial Primer (91 g/L VOC).
 - a. Applied at a dry film thickness of not less than 2.2 mils.
 2. Dunn Edwards; ENPR00-Enduraprime Ferrous Metal Primer; ULGM00-Ultrashield Galvanized Primer (50 g/l VOC).
- D. Interior Wallcovering Primer
1. Zinsser High Hide Cover Stain Oil Based Primer
 - a. Wipe dust and dirt off walls with barely damp cloth. Apply primer
 - b. Walls to not be soaked with water or solution since it can soften adhesive below the wallpaper and cause it to loosen and bubble.
 - c. Leave time for walls to dry prior to application.
 2. Rust-oleum Zinsser Shieldz Universal - Wallcovering Primer
 - a. Before applying primer, ensure all loose wallcovering is removed and surface is sound.
 3. Rust-oleum Zinsser B-I-N Advanced Synthetic Shellac Primer

2.04 EXTERIOR PRIMERS

- A. Exterior Ferrous, Non-Ferrous, Galvanized Metal, and Aluminum Primer: Factory-formulated waterborne acrylic rust-inhibitive metal primer.
1. PPG Paints; 4020 PF Series Pitt-Tech Plus Interior/Exterior DTM Industrial Primer (91 g/L VOC).
 - a. Applied at a dry film thickness of not less than 2.2 mils.

2. Dunn Edwards; ENPR00-Enduraprime Ferrous Metal Primer; ULGM00-Ultrashield Galvanized Primer (50 g/l VOC).

2.05 INTERIOR FINISH COATS

- A. Interior Eggshell Acrylic Enamel (Gloss Level 2): Factory-formulated eggshell, low VOC latex-based interior enamel.
 1. PPG Paints; 6-4310XI Series Speedhide zero Interior Latex Eggshell (0 g/L VOC).
 - a. Applied at a dry film thickness of not less than 1.4 mils.
 2. Kelly-Moore; 1010 Eggshell Finish (2 g/L VOC)
 3. Dunn Edwards; SWLL30-Spartawall Interior Acrylic Eggshell (2 g/L VOC)
- B. Interior Eggshell Acrylic Enamel (Gloss Level 3): Factory-formulated satin, low VOC latex-based interior enamel.
 1. PPG Paints; 6-4410XI Series Speedhide Zero Interior Zero VOC Latex Satin (0 g/L VOC).
 - a. Applied at a dry film thickness of not less than 1.3 mils.
 2. Kelly-Moore; 1040 Premium Pro Satin Finish (2 g/L VOC).
 3. Dunn Edwards; NOTE Dunn Edwards Velvet = Eggshell SWLL20-Spartawall Interior Acrylic Velvet (2 g/L VOC).
- C. Interior Semi-Gloss Acrylic Enamel (Gloss Level 5): Factory-formulated semi-gloss, low VOC latex-based enamel.
 1. PPG Paints; 6-4510XI Series Speedhide zero Interior Zero VOC Latex Semi-Gloss (0 g/L VOC).
 - a. Applied at a dry film thickness of not less than 1.3 mils.
 2. Dunn Edwards; SWLL50 Spartawall Interior Acrylic Semi-Gloss (0 g/L VOC).

2.06 STAIN FINISHES FOR INTERIOR WOOD SUBSTRATES

- A. Interior Wood Bio-Based Stain Finish: Hardwood Species. Low VOC
 1. Bio-based oil interior wood stain: Timber Pro; Log & Siding Formula, Smooth
 2. Sealer: Timber Pro Crystal Urethane Interior clear waterborne sealer.
- B. Interior Wood Stain and Sanding Sealer:
 1. Stain:
 - a. PPG Deft Water Based Interior Wood Stain DFT300 Series.

- b. Dunn Edwards; Old Masters Water Base Wood Stain 76101 Series Interior Water base Wood Stain. (250 g/l VOC)
- 2. Sealer:
 - a. PPG Deft Sanding Sealer Interior Water Based DFT61.
 - b. Dunn Edwards; NO WATER BASED PRODUCT LISTED
- 3. Interior Satin Wood Varnish: Clear, waterborne, acrylic/urethane.
 - a. PPG Deft Clear Polyurethane Interior Water Based Acrylic Satin DFT159.
 - b. Dunn Edwards; Old Masters Armor- Satin 721 Interior water base Urethane (110 g/l VOC)

2.07 EXTERIOR FINISH COATS

- A. Exterior Satin Acrylic Paint: Factory-formulated satin waterborne acrylic paint for exterior application.
 - 1. PPG Paints; V51-410 Series Break-Through Interior/Exterior Water-Borne Acrylic Satin (less than 50 g/L VOC).
 - a. Applied at a dry film thickness of not less than 1.3 mils.
 - 2. Dunn Edwards; SSSL20-Spartashield Exterior Water Base Acrylic Velvet (45 g/l VOC)

Metal Substrates

 - 3. PPG Paints; 90-1110 Pitt-Tech Plus Interior/Exterior DTM Industrial Enamel Satin (85 g/L VOC).
 - a. Applied at a dry film thickness of not less than 2.0 mils.
 - 4. Dunn Edwards; ENCT30-Enduracoat Interior-Exterior Industrial Coating Eggshell (100 g/l VOC)
- B. Exterior Semi-Gloss Acrylic Paint: Factory-formulated semi-gloss waterborne acrylic enamel for exterior application.

Metal Substrates

 - 1. PPG Paints; 4216 HP Series Pitt-Tech Plus Interior/Exterior DTM Industrial Enamel Semi-Gloss (90 g/L VOC).
 - a. Applied at a dry film thickness of not less than 2.0 mils.
 - 2. Dunn Edwards; ENCT50-Enduracoat Interior-Exterior Industrial Coating Semi-Gloss (100 g/l VOC)
 - 3. Stain: Timber Pro; Log & Siding Formula [Classic] [Smooth]

4. Sealer: Timber Pro; Clear Log and Siding, Smooth Formula

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
 2. If a potential incompatibility of primers applied by others exists, obtain the following from the primer applicator before proceeding:
 - a. Confirmation of primer's suitability for expected service conditions.
 - b. Confirmation of primer's ability to be top coated with materials specified.

3.02 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each substrate condition and as specified.
 1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Cementitious Substrates: Prepare concrete, brick, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
 - a. Use abrasive blast-cleaning methods if recommended by coating manufacturer.

- b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
 3. Wood Substrates: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Smoothly sand surfaces exposed to view and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer, before applying primer.
 - b. Immediately on delivery, prime edges, ends, faces, undersides, and backsides of wood to be coated.
 - c. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 4. Ferrous Metal Substrates: Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.
 - a. Blast-clean steel surfaces as recommended by coating manufacturer and according to SSPC-SP 6.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, solvent clean, and touch up with same primer as the shop coat.
 5. Non-Ferrous Metal Substrates: Clean non-ferrous and galvanized surfaces according to manufacturer's written instructions for the type of service, metal substrate, and application required.
 - a. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
 3. Use only the type of thinners approved by manufacturer and only within recommended limits.

4. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.03 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. General: Apply high-performance coatings according to manufacturer's written instructions.
 1. Use applicators and techniques best suited for the material being applied.
 2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
 3. Coating surface treatments and finishes are indicated in the coating system descriptions.
 4. Provide finish coats compatible with primers used.
 5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
- C. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 1. The number of coats and film thickness required is the same regardless of application method.
 2. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.04 FIELD QUALITY CONTROL

- A. See Div 01 , for general requirements for field inspection and testing.
- B. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:
 1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to project will be taken, identified, sealed, and certified in the presence of Contractor.
 2. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying

paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.05 CLEANING

- A. After completing painting, clean glass and paint spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.06 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
- C. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces.

3.07 INTERIOR PAINT SCHEDULE

- A. Gypsum Board:
 - 1. Walls and Ceilings to receive Low-Luster (Eggshell) Finish:
 - a. General: Two finish coats over a primer.
 - b. Primer: Interior low VOC **latex-based** primer as specified for substrate indicated.
 - c. Finish Coats: Interior low-luster (eggshell) low VOC **latex-based** enamel.
 - d. PTD-1: SW - Pure White 7005 or equal
 - 2. Walls and Ceilings to receive Semi-Gloss Finish:
 - a. General: Two finish coats over a primer.
 - b. Primer: Interior low VOC **latex-based** primer as specified for substrate indicated.
 - c. Finish Coats: Interior semi-gloss low VOC **latex-based** enamel.
 - d. PTD-1: KM - SW - Pure White 7005 or equal
- B. Metal Doors and Frames, and Other Non-Prefinished Miscellaneous Metal, metal fabrications, exposed piping, conduits, and ductwork, :
 - 1. Ferrous Metal:
 - a. General: Two finish coats over a primer.

- b. Primer: Interior **waterborne acrylic** primer as specified for substrate indicated (not required on shop-primed items).
 - c. Finish Coats: Interior satin low VOC **waterborne acrylic** enamel.
2. Zinc-Coated Metal:
- a. General: Two finish coats over a primer.
 - b. Primer: Interior **waterborne acrylic** primer as specified for substrate indicated (not required on shop-primed items).
 - c. Finish Coats: Interior satin low VOC **waterborne acrylic** enamel.
- C. Wood - Opaque Finish: Trim to receive Satin Finish:
1. General: Two finish coats over a primer.
 2. Primer: Interior low VOC, **latex-based** primer as specified for substrate indicated.
 3. Finish Coats: Interior satin low VOC **waterborne acrylic** enamel.
- D. Wood - Transparent Finish and varnish for miscellaneous field-finished wood::
1. General: Two coats varnish minimum over one coat sanding sealer and one coat stain.
 2. Stain: Interior **water based**.
 3. Sanding Sealer: Interior **water based**.
 4. Varnish: Interior clear satin **waterborne acrylic/urethane**.
- E. Wood - Transparent Penetrating Finish for softwood substrates:
1. General: One coat penetrating sealer over one coat stain.
 2. Stain: Interior bio-based oil.
 3. Sealer: Interior clear waterborne urethane.

END OF SECTION

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SECTION 10 11 00 - VISUAL DISPLAY UNITS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Tackboards.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Requirements for certified wood and low-emitting materials.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- B. Underwriters Laboratories - GREENGUARD Certification

1.04 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Product Data for CALGreen 5.504.4.1 – Finish Material Pollutant Control; Adhesives, Sealants, and Caulks: For adhesives, sealants, and caulks, including printed statement of VOC content and chemical components.
 - 2. Product Data for CALGreen 5.504.4.5 – Composite Wood Products: For composite-wood products, showing requirements for formaldehyde as specified in Table 5.504.4.
- B. GREENGUARD Certification: Submit certification that products meet GREENGUARD Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings.
- C. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for certified wood and low-emitting materials .
- D. Product Data: Provide manufacturer's data on markerboard, tackboard, trim, and accessories
- E. Shop Drawings: Indicate wall elevations, dimensions, joint locations , special anchor details.
- F. Samples: Two, 2 by 2 inches in size illustrating materials and finish, color and texture of chalkboard, porcelain enamel steel markerboard, glass markerboard, tackboard, tackboard surfacing, and trim.
- G. Test Reports: Show compliance to specified surface burning characteristics requirements.
- H. Manufacturer's printed installation instructions.

- I. Maintenance Data: Include data on regular cleaning, stain removal.

PART 2 PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for requirements for low-emitting materials, Adhesives and Sealants.

2.02 MANUFACTURERS

- A. Wolf Gordon, www.wolfgordon.com/#sle.

2.03 VISUAL DISPLAY UNITS

- A. Tackable Felt Panel:
 - 1. Manufacturers:
 - a. Basis of Design: Wolf Gordon or equal
 - 2. Top Layer - Felted with Custom Etching
 - a. Color: Zesty Orange
 - b. Width: 57"
 - 3. Sublayer: Cork 1/4 inch thick, laminated to felt surface.
 - a. Width: 48"
 - 4. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
 - 5. Length: As indicated on drawings.

2.04 MATERIALS

- A. Self-healing burlap-backed composition cork: Linseed oil, granulated cork, resin binders, and dry pigments mixed and calendered onto a natural burlap backing.
- B. Adhesives: Type used by manufacturer. Comply with CALGreen requirements for low-emitting materials.

2.05 FABRICATION

- A. Fabricate units in accordance with approved submittals.
- B. Make joints only where total length exceeds maximum manufactured length. Fabricate with the minimum number of joints, balanced around the center of the surface, as acceptable to the Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.

3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Secure units level and plumb.
- C. Carefully cut holes in boards for thermostats and wall switches.

3.03 CLEANING

- A. Clean surfaces in accordance with manufacturer's instructions.
- B. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION

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SECTION 10 14 00 - SIGNAGE**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Room and door signs.
- B. Interior directional and informational signs.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Division 22: Identification for plumbing piping and equipment
- C. Division 26. Identification for electrical systems
- D. Division 26: Exit signs required by code.
- E. Division 27: Identification for telecommunications systems

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- C. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2017.
- D. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 CALIFORNIA CODE COMPLIANCE

- A. Manufacturer shall be responsible for providing Signage and Graphic Products that comply with the documents listed below. If newer versions of these documents are in effect at the time of installation, then the Manufacturer is responsible for compliance with the newer versions.
 - 1. California Building Code (CBC).
 - 2. State of California, California Code of Regulations, Title 24, Volumes 1 and 2.
 - 3. California Department of General Services, Division of the State Architect, California Access Compliance Advisory Reference Manual.
- B. Instruction Manual for Braille Transcribing Sixth Edition, 2013, National Library Service for the Blind and Physically Handicapped, Library of Congress, <http://www.loc.gov>.

1.05 SUBMITTALS

- A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
1. Show dimensions and clearances required, performance characteristics and capacities, and wiring diagrams and/or controls as apply.
 2. Submit materials descriptions and finishes for each type of sign.
- B. Sign Location Plan: Submit floor plan drawings showing location and sign type for each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 3. Submit for approval by Owner through Architect prior to fabrication.
- D. Shop Drawings:
1. All shop drawings shall be neat, well organized and clearly legible. Elevations and plan views from the Construction Drawings may be reproduced for the sake of expedience where appropriate
 2. All shop drawings shall be drawn to scale and not subsequently reduced to fit a drawing format.
 3. Submit elevations and plan views for all sign types, including graphic layouts, complete dimensions, materials, locations of all exposed fasteners, colors and finishes. Determine the total quantity for each sign type and note it in the shop drawings
 4. Submit comprehensive section drawings for sign types where applicable, including sections of all typical members. Show fabrication and installation details, including details for securing members to one another, to building structures, and/or to site work. Show interior construction, reinforcements, anchorages, components and finishes. Site Condition Verification: sign fabricator shall inspect site to confirm installation conditions, then submit shop drawings and/or written documentation for approval indicating proposed mounting devices.
- E. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
1. Color and Finish: Submit 3 each, 6 inch x 6 inch samples of all paint colors, screen colors, vinyl colors and material finishes. All paint and screen colors are to be applied

to the appropriate substrate. Vinyl colors are to be trimmed directly off the roll and provided on the original liner.

2. Sign fabricator to submit verification of paint manufacturer used for submittal.
 3. Prior to submittal, sign fabricator shall verify that all colors submitted as samples match accurately the samples or specifications provided by Owner's Representative.
- F. Typeface(s): Submit complete typeface font(s), including upper and lower case letters, numbers and punctuation, for all typeface(s) specified. Also submit samples of letter and word spacing for each cap height specified.
- G. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- H. Verification Samples: Submit samples showing colors specified.
- I. Prototypes:
- J. Submit one full-size complete prototype each for the following Sign Types:
1. Exact sign types for prototypes to be determined by the Owner's Representative and sign programmer.
- K. Fabricator's Installation Instructions: Include installation templates and attachment devices.
- L. Fabricator's Qualification Statement.
- M. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Provide Owner with written instructions for proper cleaning of the signs, including cleaning solution, tools, and/or materials. Note any solvents that should not be used.

1.06 QUALITY ASSURANCE

- A. Pre-submittal Conference: Coordinate with the Owner's Representative prior to preparation of submittals to confirm submittal requirements and schedule. All items listed are required unless instructed otherwise by the Owner or the Owner's representative.
- B. Do not scale drawings for dimensions. Use only the written dimensions indicated on the Drawings, unless such be found in error. Sign Fabricator shall verify and be responsible for all dimensions and conditions shown by the Drawings, and shall visit the site to inspect and verify field conditions prior to fabrication and installation. The Owner's Representative shall be notified, in writing, of all discrepancies on Drawings, in field dimensions or conditions, and of changes required in construction details.
- C. Provide each type of sign as a complete unit produced by a single manufacturer, including all required mounting accessories, fittings and fastenings.
- D. All details shown in the Drawings shall be followed for exterior appearance. Minor changes in interior construction will be accepted in order to conform to Sign Fabricator's shop

practices or engineering requirements when, in the sole judgment of the Owner's Representative, such changes do not detract materially from design concept or intent. Sign Fabricator shall circle all such changes on the shop drawings.

- E. Completed work shall be structurally sound, and free from scratches, distortions, chips, breaks, blisters, holes, splits or other disfigurements considered as imperfections for the specific material.
- F. Samples, mock-ups and prototypes shall not be permanently installed, but shall be retained by the Owner's Representative for record and quality control, unless otherwise noted by the Owner's Representative.
- G. Fabricator Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.08 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 FABRICATORS

- A. Acceptable sign fabricators must meet following expectations:
- B. A thorough description of three architectural signage projects, similar in character and scope to this project, which have been completed by the Bidder within the past three years. Note specifically any and all work performed by subcontractor(s) and identify subcontractor(s) for each subcontracted portion of the work. Include photographs, brochures, shop drawings or other relevant exhibits. Provide name, address and telephone number for client contact for each project.
- C. Resumes for the following key personnel:
 - 1. Project Manager.
 - 2. Shop Fabrication Supervisor.
 - 3. Sign Installation Supervisor

D. All resumes shall include educational background, employment history, sign project experience in the same role to be performed for this project, client references, and percentage of time to be committed to this project during fabrication and installation.

1. Three references for work completed within the past three years. Any or all of these references may be the client contacts included at Item 1 above.

2.02 MANUFACTURERS

2.03 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
1. Sign Type: Flat signs with engraved panel media as specified.
 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 3. Character Height: 1 inch.
 4. Sign Height: 2 inches, unless otherwise indicated.
 5. Room Identification Signs: Unless otherwise indicated, identify with the room names and numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name.
 6. Service Rooms: Identify with the room names and numbers indicated on drawings.
 7. Rest Rooms: Identification as indicated on the drawings, including tactile identification.
- C. Interior Directional and Informational Signs:
1. Sign Type: Flat signs with engraved panel media as specified.
 2. Sizes: As indicated on drawings.
 3. Wording of signs is scheduled on drawings.
 4. Where suspended, ceiling mounted, or projecting from wall signs are indicated, provide two-sided signs with same information on both sides.

2.04 MATERIALS

- A. Cast Acrylic Sheet:
1. Provide cast (not extruded or continuous cast) methyl plastic sheet, in sizes, thickness and finishes indicated, with a minimum flexural strength of 16,000 pounds per square inch when tested in accordance with ASTM D790, and a maximum allowable

continuous service temperature of 176 degrees Fahrenheit.

2. Cast acrylic sheet shall have a flame resistance such that application of a lighted match shall not produce melting, flashing, flaring, distortion. This material shall not ignite at a temperature less than 800 degrees Fahrenheit.
3. Carefully follow manufacturer's recommended fabrication procedures regarding expansion/contraction, fastening and restraining of acrylic plastic.

B. Tactile Signs (Exterior Grade):

1. Provide exterior grade light-sensitive photopolymer layer of PVA/urethane base composition, manufactured to produce an etched surface with 1/32" relief copy and/or Braille dots after exposure to ultraviolet light, and with a minimum 95 Shore D durometer hardness rating. Photopolymer to be processed and baked to factory specifications only. Wash and post-wash exposed materials in accordance with manufacturer's instructions. Contact Nova Polymers at www.novapolymers.com, or call (888) 484-6682. Foil stamping is an acceptable substitution.
2. Sign Face Primer: Provide Matthews #74-777 Tie Bond.

C. Sign Face Topcoat : Provide Matthews Acrylic Polyurethane.

1. Text and/or Graphics Finish: Provide multiplastic or other paint silkscreened for high adhesion. Coating shear lines to precisely reflect letterforms and/or graphic outline contours. Foil Stamping is an acceptable option.
2. Protective Sign Finish: Provide Matthews A-4158 ADA clear, applied per manufacturer's instructions.

2.05 BRAILLE

- A. Sign fabricator shall be responsible for the accurate translation of all applicable tactile copy to Contracted Grade 2 Braille that shall comply with CBC Sections 11B-703.3 and 11B-703.4.
- B. Braille dots shall have a domed or rounded shape and shall comply with Table 11B703.3.1.
- C. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.
- D. Measurement ranges are as follows. Dot base diameter: 0.059 (1.5 mm) to 0.063 (1.6 mm). Distance between two dots in the same cell: 0.090 (2.3 mm) to 0.100 (2.5 mm). Distance between corresponding dots in adjacent cells: 0.241 (6.1 mm) to 0.300 (7.6 mm). Dot height: 0.025 (0.6 mm) to 0.037 (0.9 mm). Distance between corresponding dots from one cell directly below: 0.395 (10 mm) to 0.400 (10.2 mm).
- E. Braille shall be in a horizontal format.

- F. Braille shall be positioned below the corresponding text. If text is multi-lined, braille shall be placed below the entire text. Braille shall be separated 3/8 inch (9.5 mm) minimum and 1/2 inch (12.7 mm) maximum from any other tactile characters and 3/8 inch (9.5 mm) minimum from raised borders and decorative elements.

2.06 ACCESSORIES

- A. Fasteners, Hardware and Devices: Stock proprietary fastening devices of approved standard manufacture such as cadmium plated screws, bolts and washers, and stainless steel hinges.
1. Conceal all fasteners except where noted or shown otherwise.
 2. Finish on all exposed devices to match overall sign finish unless otherwise noted.
 3. Provide vandal-resistant fasteners at all exposed locations unless otherwise noted.
 4. Use fasteners fabricated from metals that are noncorrosive to either the sign material(s) or the mounting surface.
- B. Very High Bond Tape: Provide #4905/.020"/clear and/or #4950/.045"/white closed cell acrylic foam carrier with VHB adhesive, very high solvent resistance and very high shear and peel adhesion, as manufactured by 3M Scotch or approved equal.
- C. Silicone Adhesive: GE Momentive RTV6708 Clear Silicone Adhesive, or approved equivalent.
- D. Acrylic Polyurethane Paint:
1. Provide acrylic polyurethane with ultraviolet inhibitors and lightfast, weather, abrasion and graffiti resistant additives as manufactured by Matthews Paint Company (800) 323-6593. Prime and finish coats shall be mixed and applied in accordance with manufacturer's specifications. Paint finish shall be smooth, free of scratches, gouges, drops, bubbles, thickness variations, foreign matter or other imperfections.
 - a. Provide a CCR Title 24 compliant non-glare finish for all interior applications.
 - b. Provide a semigloss finish for all exterior applications.
 2. Colored Coatings for Cast Acrylic Sheet: Use paints for background color which are recommended by acrylic manufacturer for optimum adherence to acrylic surfaces and are non-fading for application intended.
 3. Provide verification of paint manufacturer used for all paint work.
- E. Vinyl Film: Provide opaque reflective or non-reflective vinyl film as indicated, 0.0355" minimum thickness, with pressure sensitive permanent adhesive backing; 3M Scotchcal or approved equal. All colors shall be integral and not surface applied except where custom color(s) are specified in the Drawings. All custom colors shall be flood coated on white vinyl.

2.07 FABRICATION

- A. Intent of Specifications: All finished work shall be of the highest quality in order to pass eye-level examination and scrutiny by Owner's Representative.
1. All Work shall be free from burrs, dents, raw edges and sharp corners.
 2. Finish all welds on exposed surfaces as required so they are not visible in the finished work.
 3. Finish all surfaces smooth unless otherwise indicated or specified.
- B. Surfaces which are intended to be flat shall be free from bulges, oil canning, gaps, or other physical deformities. Such surfaces shall be fabricated to remain flat under installed conditions.
1. Fabricate all cabinets, panels and components with smooth, mechanically finished edges. All edges shall be true, and all corners shall be square. Where edges are specified to be painted, fill and sand smooth as required prior to painting.
 2. Cut routed letterforms and/or graphics clean and true to match adjacent surface-applied letterforms and/or graphics.
 3. Exercise care to protect all polished and/or plated surfaces so that they remain unblemished in the finished work.
 4. Isolate dissimilar materials. Exercise particular care to isolate nonferrous metals from ferrous metals as required to prevent corrosion.
 5. All surfaces shall be flat to a tolerance of plus or minus 1/16" when measured at any point with a ten-foot straightedge.
 6. All visible sign surfaces of the same type shall have the same finish. Color and/or finish shall be consistent across the entire surface of a sign.
 7. All reveals shall be of uniform width; all butt joints shall be tight and closed along the entire length.
 8. All gaps between milled components, when assembled, shall not exceed a tolerance of .005".

2.08 GRAPHICS

- A. Provide colors and/or finish textures as specified or indicated in the drawings or, where not specified or indicated, as selected by the Owner's Representative.
1. Interior Colors/Finishes: Colors of sign graphics (text, arrows and/or symbols) shall have a minimum of 70% contrast with sign background behind graphics. Finish shall be nonglare on all sign backgrounds behind graphics on identification and directional signs.

- B. Graphics: All text, arrows and symbols shall be provided in the sizes, colors, typefaces and spacing specified in the drawings. All text shall be a true, clean, digitally or photomechanically accurate reproduction of the typefaces specified with letterspacing and directional arrows as shown in the drawings.
1. Lettering: Custom Typography: Per Owner approved fonts.
- C. Sign Schedule: Copy shown in the drawings is for layout purposes only; all final copy, quantities and references for all signs are shown in the floor plan unless otherwise noted. The Sign Fabricator shall clarify any perceived irregularities in the Sign Schedule with the Owner's Representative prior to fabrication.

2.09 SIGN TYPES

- A. Flat Signs: Signage media without frame.
1. Edges: Square.
 2. Corners: Square.
 3. Wall Mounting of One-Sided Signs: Tape adhesive.
 4. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated, color selected from manufacturer's standard colors, attached with screws in predrilled mounting holes, set in clear silicone sealant.
 5. Suspended Mounting: Stainless steel suspension cables, cable clamps, and ceiling fastener suitable for attachment to ceiling construction indicated.
- B. Radius / Curved Signs: One-piece, curved extruded aluminum media holder securing flat, flexible sign media by curved lip on two sides; other two sides closed by end caps; concealed mounting attachment.
1. Sizes: As indicated on drawings.
 2. Finish: Natural (clear) anodized.
 3. Sign Orientation: Curved in horizontal section.
 4. Wall Mounting of One-Sided Signs: Mechanical anchorage, with predrilled holes, and set in clear silicone sealant.
 5. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated, color selected from manufacturer's standard colors, attached with screws in predrilled mounting holes, set in clear silicone sealant.
 6. Suspended Mounting: Stainless steel suspension cables, cable clamps, and ceiling fastener suitable for attachment to ceiling construction indicated.
- C. Color and Font: Unless otherwise indicated:
1. Character Font: Helvetica, Arial, or other sans serif font.

- 2. Character Case: Upper case only.
- 3. Background Color: Clear.
- 4. Character Color: Contrasting color.

2.10 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
 - 1. Total Thickness: 1/16 inch.

PART 3 EXECUTION

3.01 INSPECTION

- A. Owner’s Representative reserves the right to inspect the Work in the Sign Fabricator’s shop before it is shipped to the job site for installation.
- B. Verify that substrate surfaces are ready to receive work.
- C. Sign Fabricator shall inspect all installation locations for conditions that will adversely affect the execution, permanence and/or quality of the Work, and notify Owner’s Representative in writing of any and all unsatisfactory conditions. Sign Fabricator shall not proceed with installation until said unsatisfactory conditions have been corrected. Commencement of installation indicates acceptance of site conditions and guarantees delivery of an acceptable product.
- D. Signs and identification devices shall be field inspected after installation and approved by the enforcing agency prior to the Final Completion. The inspection shall include, but not be limited to, verification that braille dots and cells are properly spaced and the size, proportion and type of raised characters are in compliance with these regulations.

3.02 INSTALLATION

- A. Install in accordance with manufacturer’s instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

3.03 CLEANING AND PROTECTION

- A. At completion of installation, clean all sign surfaces in accordance with manufacturer’s instructions.
- B. Protect all signs from damage until acceptance by Owner’s Representative; repair or replace damaged units as required.

- C. Clean and/or repair all evidence of installation work or damage to adjacent surfaces prior to completion of work.
- D. Remove all protective materials and dispose of properly off site.

END OF SECTION

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SECTION 10 22 15 - FIXED GLASS PANEL PARTITIONS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Section includes fixed, framed glass panel partitions with swinging glass doors at Teen Room
- B. Section includes interior glass panel at Children's Library

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 08 71 00 - NT Door Hardware: Cylinders for locksets.

1.03 REFERENCE STANDARDS

- A. American Architectural Manufacturers Association (AAMA): www.aama.org:
 - 1. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum
- B. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI): www.asce.org
 - 1. ASCE/SEI 7 Minimum Design Loads for Buildings and Other Structures
- C. ASTM International (ASTM): www.astm.org
 - 1. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
 - 2. ASTM B221/ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - 3. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
 - 4. ASTM C1172 Standard Specification for Laminated Architectural Flat Glass
 - 5. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials
 - 6. ASTM E90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 - 7. ASTM E413 Classification for Rating Sound Insulation
ASTM E557 Guide for the Installation of Operable Partitions
Builders Hardware Manufacturers Association (BHMA): www.buildershardware.com
ANSI/BHMA A156 Series
California Department of Health Services (DHCS): www.dhcs.ca.gov
Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental

ChambersCode of Federal Regulations16 CFR 1201 Safety Standard for Architectural Glazing MaterialsInternational Code Council (ICC): www.iccsafe.orgICC A117.1 Accessible and Usable Buildings and Facilities (ANSI)U.S. Architectural & Transportation Barriers Compliance Board: www.access-board.govAmericans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities

- 8. ASTM E557 Guide for the Installation of Operable Partitions
- D. Builders Hardware Manufacturers Association (BHMA): www.buildershardware.com
 - 1. ANSI/BHMA A156 Series
- E. California Department of Health Services (DHCS): www.dhcs.ca.gov
 - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers
- F. Code of Federal Regulations
 - 1. 16 CFR 1201 Safety Standard for Architectural Glazing Materials
- G. International Code Council (ICC): www.iccsafe.org
 - 1. ICC A117.1 Accessible and Usable Buildings and Facilities (ANSI)
- H. U.S. Architectural & Transportation Barriers Compliance Board: www.access-board.gov
 - 1. Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities

1.04 ADMINISTRATIVE REQUIREMENT

- A. Coordination:
 - 1. Coordinate installation of glass panel partitions with installation of floor, wall, and ceiling construction to comply with substrate tolerance requirements of partition manufacturer.
 - 2. Coordinate installation of anchors and secondary structural members indicated on approved glass panel partition shop drawings and specified in other sections.
- B. Preinstallation Conference: Conduct conference at Project Site

1.05 ACTION SUBMITTALS

- A. Product Data: For each glass panel partition and door component specified, including:
 - 1. Glass panels.
 - 2. Frame and sill tracks.

3. Door hardware and accessories.
- B. Shop Drawings: For fixed glass panel partitions.
1. Include plans, elevations, sections, and details. Provide numbered panel installation sequence.
- C. Show locations and requirements for tracks, bracing, blocking, and attachments to other work.
- D. Samples for Verification: For each exposed component including hardware, for each color and finish selected, of size indicated below:
1. Glass: Units 12 inches (300 mm) square.
 2. Exposed Frame, Track, and Sill Members: Not less than 6 inches (150 mm) long.
 3. Hardware: One of each type of exposed door hardware items.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified installer.
- B. Warranty: Sample of unexecuted manufacturer warranty.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced Installer equipped and trained for installation of glass panel partitions required for this Project with record of successful completion of not less than five projects of similar scope.
- B. Single Source Responsibility: Provide glass panel partitions and associated hardware by a single manufacturer through a single source

1.08 WARRANTY

- A. Special Manufacturer's Warranty: Standard form in which manufacturer agrees to repair or replace components of glass panel partitions that demonstrate deterioration or faulty operation due to defects in materials or workmanship under normal use within warranty period specified.
1. Warranty Period: Five years date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Glass door assemblies by dormakaba or approved equal
- B. Basis of Design: Glass interior systems by CR Laurence or approved equal

2.02 PERFORMANCE REQUIREMENTS

- A. Acoustical Performance: Provide glass panel partition tested by qualified testing agency as follows:
1. Sound-Transmission Requirements: Tested for laboratory sound-transmission loss performance according to ASTM E90, determined by ASTM E413, and rated for not less than STC indicated.

2.03 GLASS PANEL PARTITIONS

- A. Fixed Glass Panel Partitions: Framed glass panel partition with perimeter channel frames, butt-glazed dry joint and framed joints between panels, equipped with swinging doors where indicated.
1. Basis of Design: dormakaba, PURE Enclose.
 2. Sound Transmission Class (STC), ASTM E 90 and Outdoor-Indoor Transmission Class (OITC), ASTM E 1332:
 - a. Framed partition with 12.0 mm thick laminated glass: STC 32; OITC 30.
 - b. Swinging door with 12.0 mm thick laminated glass: STC 15; OITC 15.
 3. Partition Frames: Aluminum extrusion, 1-3/4 by 4-1/8 inch (44 by 105 mm).
- B. Fixed Glass Panels: Frameless glass panel with top and bottom glazing channels, wet glazed
1. Basis of Design: CR Laurence, Wet Glazed Frameless Glass
 2. Glass: Comply with requirements of ASTM C1048 for kind FT (full tempered).
 - a. Thickness: 1/2 inch
 - b. Edge Treatment: Provide machine ground and polished edges for exposed glass edges and flat ground edges for butting glass edges
 - c. Head Rail: 1 inch by 2 inches; C.R. Laurence, WU2BSCL, or equal
 - d. Sill Rail: 1 inch by 2 inches; C.R. Laurence, WU3BSCL, or equal
 - e. Extruded aluminum; mill finish, brushed stainless steel clad

2.04 GLASS PANELS AND DOORS

- A. Glass Panels, General: Provide glass panels that comply with 16 CFR 1201, Category II requirements for safety glazing. Permanently mark glazing with certification label of the SGCC.
1. Glass and Door Panel Thickness: Thickness required for size of panel based upon manufacturer's written recommendations, but not less than 12 mm.

- B. Fully Tempered Clear Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; thickness 16.0 mm.

2.05 SWINGING DOORS

- A. Accessibility Standard: Comply with applicable provisions in ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 requirements of authorities having jurisdiction.
- B. Double Door: Glass panel matching partition panel material and thickness;) 72 by 84 inches (1829 by 2134 mm).

2.06 MATERIALS

- A. Aluminum: ASTM B221 (ASTM B221M), with strength and durability characteristics of not less than Alloy 6063-T5.
- B. Stainless Steel finishes:

2.07 METAL FINISHES

- A. Aluminum Finish:
 - 1. Powder Coat: Manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm), in color selected by Architect from manufacturer's full range.

2.08 DOOR HARDWARE AND FITTINGS

- A. Door Hardware, General: All-glass door hardware units in types, sizes, quantities, and mounting locations recommended by manufacturer for glass door types, sizes, and operation. For exposed components, match metal and finish of exposed partition fittings unless otherwise noted.
- B. Pulls and Handles: Back-to-back.
 - 1. Design: Vertical bar, 1 ¼" diameter 36 inch.
 - a. Basis of Design: dormakaba, TG 9387 Ladder Pull or equal
- C. Patch Fittings for Swinging Doors: At head on pivot side.
 - 1. Basis of Design: DORMA, PURE Pivot Header.
- D. Rail Fittings, General: All-glass clamping fittings in types, sizes, quantities, and mounting locations recommended by manufacturer for glass door types, sizes, and operation and glass panel configurations.
 - 1. Basis of Design, dormakaba DRS Rails, or equal
 - 2. Rail Configurations:

- a. Bottom Rail: 10 inches (254 mm) by length required for door size indicated.
 - 1) Profile: Tapered.
 - 2) With manufacturer's standard pivot.
- E. Concealed Overhead Closers and Bottom Pivots: Center hung; BHMA A156.4, Grade 1. Provide housings, bottom arms, top walking beam pivots, mounting plates, and accessories.
 - 1. Basis of Design: DORMA, RTS88, or equal
 - 2. Swing: Single acting, with positive dead stop.
 - 3. Opening Force: Comply with interior door operating force of authorities having jurisdiction for accessibility requirements and egress doors and barrier free requirements.
- F. Accessory Fittings: Floor stops.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine partition substrates to determine if work is within glass panel partition manufacturer's required tolerances and ready to receive work. Proceed with installation of partitions once conditions affecting installation and performance of partitions meet manufacturer's requirements.
- B. Verify that partition construction adjacent to acoustically-rated glass panel partitions complies with requirements of ASTM E557.

3.02 PARTITION INSTALLATION

- A. General: Comply with glass panel partition manufacturer's written installation instructions and approved shop drawings.
- B. Install glass panel partitions after other finishing operations have been completed.
- C. Set units level, plumb, and true to line, with uniform joints.
- D. Fasten glass panel partition framing to building structure and supports as indicated on approved shop drawings, utilizing approved fasteners and spacing.
- E. Set framing in continuous bed of sealant or in positive contact with preformed gasket where indicated.
- F. Set, seal, and grout floor closer cases.

3.03 ADJUSTING

- A. Adjust doors and hardware to produce smooth operation and tight, uniform fit.

- B. Adjust door closers to required timing and force.
- C. Adjust latches and locks for smooth operation.
- D. Test and adjust hardware linked to access control system.
- E. Replace damaged panels and accessories.

3.04 CLEANING

- A. Remove temporary protection to prefinished surfaces.
- B. Clean glass panels in accordance with glass manufacturer's written instructions. Do not use cleaning agents or methods not approved by glass manufacturer.
- C. Clean exposed metal surfaces to factory new appearance

END OF SECTION

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SECTION 10 26 00 - WALL PROTECTION**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Protective wall covering.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.

1.03 REFERENCE STANDARDS

- A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2023, with Editorial Revision.
- B. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2021.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- D. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2023.
- E. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

1.04 SUBMITTALS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.
- C. Shop Drawings: Include plans, elevation, sections, and attachment details. Show design and spacing of supports for protective corridor handrails, required to withstand structural loads.
- D. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
 - 1. Submit two samples of protective wall covering, 6 by 6 inches square.
- E. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

- F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.
- B. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item.

1.06 WARRANTY

- A. See Section 01 78 39 - Project Record Documents for additional warranty requirements.
- B. Manufacturer Warranty: Provide 5-year manufacturer warranty for metal crash rails. Complete forms in Owner's name and register with manufacturer.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures or internal connection failures.
 - b. Deterioration of materials beyond that expected of normal use, as intended by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Protective Wall Covering:
 - 1. Momentum Textiles ; P3Tec: www.momentumtextilesandwalls.com/#sle
 - 2. or equal

2.02 PERFORMANCE CRITERIA

- A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for compliance with applicable provisions of ASTM D256 and/or ASTM F476.
- B. Chemical and Stain Resistance: Unless otherwise noted, provide protection products and assemblies with chemical and stain resistance complying with applicable provisions of ASTM D543.
- C. Fungal Resistance: Unless otherwise noted, provide protection products and assemblies which pass ASTM G21 testing.

2.03 PRODUCT TYPES

- A. Protective Wall Covering:
 - 1. Material: High-impact acrylic-modified vinyl.
 - 2. Thickness: 0.030 inch.
 - 3. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84. Class A; NFPA 286
 - 4. Color: Sunbleached.
 - 5. Style: Alpine
 - 6. Size: 48" wide rolls
 - 7. Texture: Suede.
 - 8. Accessories: Provide manufacturer's standard color-matched trim and moldings.
 - a. Inside Corner Trim: Standard angle
 - b. Outside Corner Trim: Standard angle.
 - 9. Mounting: Adhesive.
- B. Adhesives and Primers: As recommended by manufacturer.
 - 1. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials, Adhesives and Sealants.

2.04 FABRICATION

- A. Fabricate components with tight joints, corners and seams.
- B. Pre-drill holes for attachment.
- C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
- B. Verify that field measurements are as instructed by the manufacturer.
- C. Verify that substrate surfaces for adhered items are clean and smooth.

1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer. Follow adhesive manufacturer's recommendations for remedial measures at locations and/or application conditions where adhesion test's results are unsatisfactory.
- D. Start of installation constitutes acceptance of project conditions.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.
- B. Position protective wall covering no less than _____ inch above finished floor to allow for floor level variation.
 1. Full-Height Installation: Establish a plumb line located at edge of starting point of first sheet to ensure following sheets will be installed plumb.
 2. Wainscot Installation: Establish a level line at the specified height for entire length of run. Install by aligning top of edge of covering with this line.
 3. Apply adhesive with 1/8 inch V-notch trowel to an area of wall surface that can be completed within cure time of the adhesive.
 4. Install trim pieces as required for a complete installation. Allow tolerance for thermal movement.
 5. Use a roller to ensure maximum contact with adhesive.
 6. At inside and outside corners cut covering sheets to facilitate installation of trim pieces or corner guards.

3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.04 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION

SECTION 10 28 00 - COMMERCIAL TOILET ACCESSORIES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Commercial toilet accessories.
- B. Under-lavatory pipe supply covers.
- C. Baby changing table.
- D. Adult changing table
- E. Utility room accessories.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 09 30 00 - Tiling: Tile. Ceramic washroom accessories.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011 (Reaffirmed 2022).
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2022.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2022.
- F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
- G. ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings; 2022.
- H. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017 (Reapproved 2022).
- I. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- J. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

- K. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2021.
- L. ASTM D4802 - Standard Specification for Poly(Methyl Methacrylate) Acrylic Plastic Sheet; 2016.
- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- N. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2022.
- O. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- P. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- B. Shop Drawings: Identify where cutouts are required in other work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.
- D. Maintenance Data: Instructions, including replaceable parts and service recommendations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. General: Only a maximum 1-1/2-inch-diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.
- B. Source limitations: Obtain toilet and bath accessories from single source from single manufacturer.
- C. Basis-of-Design Products: The design for accessories is based on products by Bobrick Washroom Equipment, Inc., unless otherwise indicated.

- D. Commercial Toilet, Shower, and Bath Accessories: Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
1. American Specialties, Inc; _____: www.americanspecialties.com/#sle.
 2. Bradley Corporation; _____: www.bradleycorp.com/#sle.
 3. or equal
- E. Under-Lavatory Pipe Supply Covers:
1. Plumberex Specialty Products, Inc: www.plumberex.com/#sle.
- F. Marked BCS; Baby Changing Station:
1. Koala Kare Products: www.koalabear.com/#sle. Division of Bobrick Washroom Equipment, Inc; KB310-SSWM Surface Mounted;
- G. Marked ACS: Adult Changing Station:
1. Koala Kare Product: www.koalabear.com/#sle. Division of Bobrick Washroom Equipment, Inc; KB3000-AHL Adjustable Height Changing Station; Surface Mounted
- H. Provide products of each category type by single manufacturer.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
1. Grind welded joints smooth.
 2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.
- B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- F. Zinc Alloy: Die cast, ASTM B86.
- G. Acrylic Plastic Sheet: ASTM D4802.
- H. Mirror Glass: Minimum nominal thickness 6.0 mm; tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering, electro-plated copper coating, and protective organic coating.

- I. Adhesive: Two component epoxy type, waterproof.
- J. Fasteners, Screws, and Bolts: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed; tamper-proof; security type.

2.03 FABRICATION

- A. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- B. Recessed and Semi-Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.
- C. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation.
 - 1. Provide galvanized-steel backing sheet, not less than 0.034 inch (22 gage) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- D. Mirror Unit Hangers: Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove that will permit rigid, tamperproof, and theftproof installation.

2.04 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.
- C. Powder-Coated Steel: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat, and two finish coats of powder coat enamel.
- D. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.
- E. Back paint components where contact is made with building finishes to prevent electrolysis.

2.05 COMMERCIAL TOILET ACCESSORIES

- A. Marked TPD; Toilet Paper Dispenser: Double roll, recessed, stainless steel unit with pivot hinge, tumbler lock.
 - 1. Products:
 - a. Bobrick ;B-3888

- B. Marked PT/W; Combination Towel Dispenser/Waste Receptacle: Recessed with projecting waste receptacle, stainless steel; seamless wall flanges, continuous piano hinges.
1. Waste receptacle liner: Reusable, heavy-duty vinyl. 368-16
 2. Towel dispenser capacity: .standard core rolls up to 8" wide, 8" diameter, 800ft long
 3. Waste receptacle capacity: 12 gallons.
 4. Products:
 - a. Bobrick; B-3961
 - b. Verify with Owner for options (folded tower dispenser module; automatic universal roll towel dispenser module, liner mate for 12-gal waste) prior to ordering.
- C. Marked SD; Automated Soap Dispenser: Liquid soap dispenser, wall-mounted, with stainless steel cover and window to gauge soap level, tumbler lock.
1. Minimum Capacity: 30 ounces.
 2. Products:
 - a. Bobrick; B-2012
- D. Marked MIR Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass; ASTM C1048.
1. Size: nom..36" height x 24" wide x 0.5" deep
 2. Framless: Secure with mirror clip set, 5/8" wide
 - a. C.R. Laurence; MC01BN - brushed nickel
 3. Backing: Natural MDF
 4. Products:
 - a. Ren Wil Faiza <https://renwil.com>; MT2451 Arched Flat Accent Mirror; Waren Collection
- E. Marked SCD; Seat Cover Dispenser: Stainless steel, recessed, reloading by concealed opening at base, tumbler lock.
1. Minimum capacity: 500 seat covers.
 2. Products:
 - a. Bobrick B-3013
- F. Marked GB; Grab Bars: Stainless steel, smooth surface.
1. Heavy Duty Grab Bars: Floor supports are not acceptable.

- a. Push/Pull Point Load: Minimum 250 pound-force, minimum.
 - b. Dimensions: 1-1/2 inch outside diameter, minimum 0.125 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Length and Configuration: As indicated on drawings.
 - d. Products:
 - 1) American Specialties, Inc..
 - 2) Bobrick Model B-6806 .
- G. Wall Mounted Coat Hook: Satin stainless hat and coat hook. Provide one per Restroom.
- 1. Products:
 - a. Bobrick Model B-6827.
- H. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, one piece door, stainless steel piano-type hinge . Provide one per restroom.
- 1. Products:
 - a. Bobrick B-270.

2.06 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Under-Lavatory Pipe and Supply Covers:
- 1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
 - 2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
 - 3. Construction: 1/8 inch flexible PVC.
 - a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - b. Comply with ASTM C1822, type indicated.
 - c. Comply with ASME A112.18.9.
 - d. Comply with ICC A117.1.
 - e. Microbial and Fungal Resistance: Comply with ASTM G21.
 - 4. Color: White.
 - 5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.

6. Products:
 - a. Plumberex Specialty Products, Inc; Plumberex Handy-Shield Maxx:
www.plumberex.com/#sle.

2.07 BABY CHANGING STATIONS

- A. Marked BCS; Baby Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285. Unit to provide smooth concave changing area, nylon safety strap, two hooks for bags, and instruction graphics
 1. Material: Stainless steel.
 2. Mounting: Surface.
 3. Minimum Rated Load: 250 pounds.
 4. Products: KB310-SSWM

2.08 ADULT CHANGING STATION

- A. Marked ACS: Adult Changing Station: Wall-mounted folding adjustable height adult changing station for use in commercial toilet facilities, meeting or exceeding ISO 60601-1 and 2. Provide with switched electrical supply; station has two integrated controls for electronic height adjustable with fail-safe battery battery backup.
 1. Material: Steel frame with UHMW PE bed surface, stainless steel wall unit covering and retaining bars
 2. Mounting: Surface mount
 3. Minimum Rated Load: 500 pounds
 4. Products:
 - a. Koala Kare Products: Model KB3000-AHL

2.09 UTILITY ROOM ACCESSORIES

- A. Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, hat-shaped channel.
 1. Holders: Three spring-loaded rubber cam holders.
 2. Length: 26 inches.
 3. Products:
 - a. American Specialties, Inc; _____: www.americanspecialties.com/#sle.
- B. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.

1. Mop/broom holders: Four spring-loaded rubber cam holders at shelf front.
2. Length: 36 inches.
3. Products:
 - a. American Specialties, Inc; _____: www.americanspecialties.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify exact location of accessories for installation.
- C. See Section 06 10 00 Rough Carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, and as indicated on the drawings.
- D. Apply sealant to perimeter between accessories and wall surface where accessory edge is permanent.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

3.05 ADJUSTMENT AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

- C. Construction Waste Management: Manage construction waste in accordance with provisions of Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION

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SECTION 12 24 00 - WINDOW SHADES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Interior manual roller shades.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 06 10 00 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.03 REFERENCE STANDARDS

- A. C2C (DIR) - C2C Certified Products Registry; Cradle to Cradle Products Innovation Institute; Current Edition.
- B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.
- C. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work related to products of this section; require attendance of affected installers.
- B. Sequencing:
 - 1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
 - 2. Do not install shades until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. CALGreen Submittals: Provide the following:
 - 1. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
- C. Shade Schedule: Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color,

- D. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
- E. Certificates: UL (GGG): GREENGUARD Gold certification for all shade fabrics.
- F. Source Quality Control Submittals: Provide test reports indicating compliance with specified fabric properties.
- G. Selection Samples: Include fabric samples in full range of available colors and patterns.
- H. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- I. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.
 - 1. Precautions regarding cleaning materials and methods,
 - 2. Instructions for operation and maintenance of hardware and controls
- J. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum 10 years of documented experience with shading systems of similar size and type.
 - 1. Manufacturer's authorized representative.
 - 2. Factory training and demonstrated experience.
- C. NFPA Flame-Test: Passes NFPA 701: Materials tested shall be identical to products proposed for use.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

1.08 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

- A. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
 - 1. Shade Hardware: 25 years.
 - 2. Fabric: 25 years.
 - 3. Aluminum and Steel Coatings: One year.

PART 2 PRODUCTS**2.01 GENERAL REQUIREMENTS**

- A. Refer to Section 01 81 13 - Sustainable Design Requirements: Requirements for low-emitting materials.
- B. Provide all shade fabrics with UL (GGG) GREENGUARD Gold certificate.

2.02 MANUFACTURERS

- A. Interior Manually Operated Roller Shades:
 - 1. MechoShade Systems LLC; Mecho/5 System: www.mechoshade.com/#sle.
 - 2. Hunter Douglas Architectural; RB500 Manual Roller Shades: www.hunterdouglasarchitectural.com/#sle.
 - 3. SWFcontract, a division of Springs Window Fashions, LLC.; Pro Series Manual Solar Shade System: www.swfcontract.com/#sle.
- B. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.03 ROLLER SHADES - GENERAL

- A. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
- B. Provide shade system that operates smoothly when shades are raised or lowered.
- C. Provide shade system that is Cradle-to-Cradle certified and listed in C2C (DIR).

2.04 MANUALLY OPERATED WINDOW SHADES

- A. Heavy-Duty Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation.
- B. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent

shade from being raised or lowered too far.

1. Clutch mechanism: Fabricated from POM thermoplastic with welded 0.354 inch (9 mm) primary steel post with rotational bearing, overrunning design, and positive mechanical engagement of drive mechanism to tube. White or Black color as selected by Architect. Center bead chain placement for right or left hand operation and accommodates side channel with no adjustment of chain location.
 2. Bead chain loop: 120 Lb. Stainless steel bead chain.
 3. Bead Chain Hold Down: Spring-Loaded Tensioner complying with ANSI/WCMA A100.1-2018 safety standard.
- C. Single Roller Configuration:
1. Mounting: Endcaps and headbox.
 2. Headbox Ceiling/Wall style: Aluminum fabrication with a top/back cover and fascia with endcaps for mounting:
 3. Finish: Standard manufactures choice of (5) colors as selected by the Architect.
- D. Rollers: Extruded aluminum roller tube of appropriate diameter to support shade fabric with minimal deflection.
1. Minimum Roller Tube Diameter: 1.25 inches (32 mm).
 2. Fabric Connection to Roller Tube: Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive
 3. Fabric Length: 6 inches (152 mm) greater than window height minimum.
 4. Hembar: Machine extruded aluminum.

2.05 ROLLER SHADES - BASIS OF DESIGN PRODUCTS

- A. Roller Shades - Basis of Design: MechoShade Systems LLC; Mecho/5 System; www.mechoshade.com/#sle.

2.06 ACCESSORIES

- A. Fascia Box: Removable extruded aluminum fascia box with closed top, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; baked enamel finish.
1. Fascia box to be capable of installation across two or more shade bands in one piece.
 2. Provide single fascia box to accommodate shades.
 3. Color: White.
 4. Profile: Square.

5. Configuration: Captured and continuous.

2.07 SHADE FABRIC

- A. Fabric Orientation: Railroaded, fabric is turned 90 degrees off the roll.
 1. Battens: Manufacturer's standard material, full width of shade, and enclosed in welded shade fabric pocket; locate as indicated on drawings.
 2. Seams for Railroaded Fabric: Manufacturer's standard sewn seam; locate as indicated on drawings.
- B. Fabric for Light Filtering Shades: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
 1. Solar Shade Series 1600 Series 2x2 basket weave pattern
 - a. GREENGUARD Gold; Manufacturer to supply GREENGUARD Gold certificate
 - b. Fire rating: NFPA 701
 - c. 3 percent open
 - d. Color: Dove Grey 1605
 2. Material Certificates and Product Disclosures:
 - a. Low-Emitting Material Certification: Greenguard Gold certified and listed in UL (GGG).

2.08 FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.
 2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.
- C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

- C. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

- A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
- B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.
- C. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.
- C. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 78 39 - Project Record Documents for closeout submittals.
- B. See Section 01 77 00 - Closeout Procedures for additional requirements.
- C. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.

3.06 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 36 00 - COUNTERTOPS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Countertops for architectural cabinet work.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01 81 13 - Sustainable Design Requirements: Requirements for certified wood and low-emitting materials.
- C. Section 06 41 00 - Architectural Wood Casework
- D. Division 22: Sinks, lavatories, and fittings

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- B. AWI (QCP) - Quality Certification Program; Current Edition.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- D. AWMAC (GIS) - Guarantee and Inspection Services Program; Current Edition.
- E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- F. ISFA 3-01 - Classification and Standards for Quartz Surfacing Material; 2013.
- G. MIA (DSDM) - Dimensional Stone Design Manual, Version VIII; 2016.
- H. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- I. PS 1 - Structural Plywood; 2019.
- J. WI (CCP) - Certified Compliance Program (CCP); Current Edition.

1.04 SUBMITTALS

- A. CALGreen Submittals: Provide product data to demonstrate that adhesives, sealants, and caulks used on the project meet the requirements of the following standards:
 - 1. TABLE 5.504.4.1 - ADHESIVE VOC LIMIT; TABLE 5.504.4.2 - SEALANT VOC LIMIT included in 01 81 13 - Sustainable Design Requirements.

- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
- F. Sustainable Design Submittal: Documentation for sustainably harvested wood-based components.
- G. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- H. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- I. Installation Instructions: Manufacturer's installation instructions and recommendations.
- J. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Natural Stone Institute (NSI) Accredited Natural Stone Fabricator; www.naturalstoneinstitute.org/#sle.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.
- C. Quality Certification:
 - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
 - 2. Comply with AWMAC (GIS) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
 - 3. Comply with WI (CCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.woodworkinstitute.com/#sle.

4. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
5. Provide designated labels on shop drawings as required by certification program.
6. Provide designated labels on installed products as required by certification program.
7. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
 1. Flat Sheet Thickness: 3cm (1-1/8).
 2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; resin, _____, and pigments; homogenous, non-porous and capable of being worked and repaired using standard stone fabrication tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers:
 - 1) Cosentiono Silestone; Miami White 17; [www.https://www.cosentino.com/#sle](https://www.cosentino.com/#sle).
 - 2) Or equal.
 - b. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with NSI (DSDM).
 - c. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.

- d. NSF approved for food contact.
 - e. Sinks: Separate units for undercounter mounting; minimum 3/4 inch wall thickness; comply with IAPMO Z124.
 - f. Finish on Exposed Surfaces: Polished.
 - g. Color and Pattern: As selected by Architect from manufacturer's full line.
3. Other Components Thickness: 3/4 inch, minimum.
 4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
 5. Skirts: As indicated on drawings.
 6. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

2.02 MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- C. General Requirements for Joint Sealants and Adhesives: Conform with requirements of Section 01 81 13 - Sustainable Design Requirements for certified low-emitting materials.
- D. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 ACCESSORIES

- A. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface. Provide where shown.

2.04 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 1. Join lengths of tops using best method recommended by manufacturer.
 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - a. Rout a 1/8 inch drip groove at underside of exposed overlapping edges, set back 1/2 inch from face of edge.
 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 - 2. Height: 4 inches, unless otherwise indicated.
- C. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

3.06 PROTECTION

- A. Protect installed products until completion of project.

22212.00

Sonoma County Library
Healdsburg Library Refresh
139 Piper St

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 22 00 50 - BASIC PLUMBING MATERIALS AND METHODS**PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
 - 1. Strainers.
 - 2. Valve boxes.
 - 3. Gauges.
 - 4. Thermometers.
 - 5. Access Doors.
 - 6. Flexible joints.
 - 7. Insulation.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. This Section is a part of each Division 22 Section.

1.03 ADDITIONAL REQUIREMENTS

- A. Furnish and install any incidental work not shown or specified which is necessary to provide a complete and workable system.
- B. Make all temporary connections required to maintain services during the course of this Contract without additional cost to the Owner. Notify the Owner seven days in advance before disturbing any service.
- C. Plumbing work done under this contract shall not adversely affect the operation of the existing plumbing systems.

1.04 REFERENCES AND STANDARDS

- A. Where material or equipment is specified to conform to referenced standards, it shall be assumed that the most recent edition of the standard in effect at the time of bid shall be used.
 - 1. CSA – Canadian Standards Association International.
 - 2. ANSI - American National Standards Institute.
 - 3. ASTM - American Society for Testing and Materials.
 - 4. CCR - California Code of Regulations.
 - a. Title 8 - Division of Industrial Safety, Subchapter 7; General Industry Safety Orders, Articles 31 through 36.

5. NCPWB - National Certified Pipe Welding Bureau.
 6. CEC - California Electrical Code.
 7. NEMA - National Electrical Manufacturers' Association.
 8. NFPA - National Fire Protection Association.
 9. OSHA - Occupational Safety and Health Act.
 10. UL - Underwriters' Laboratories, Inc.
- B. Requirements of Regulatory Agencies:
1. The publications listed below form part of this specification; comply with provisions of these publications except as otherwise shown or specified.
 - a. California Building Code, 2022.
 - b. California Electrical Code, 2022.
 - c. California Energy Code, 2022.
 - d. California Fire Code, 2022.
 - e. California Green Building Standards Code, 2022.
 - f. California Mechanical Code, 2022.
 - g. California Plumbing Code, 2022.
 - h. California Code of Regulations, Title 24.
 - i. California Health and Safety Code.
 - j. CAL-OSHA.
 - k. California State Fire Marshal, Title 19 CCR.
 - l. National Fire Protection Association.
 - m. Occupational Safety and Health Administration.
 - n. Other applicable state laws.
 2. Nothing in Drawings or specifications shall be construed to permit work not conforming to these codes, or to requirements of authorities having jurisdiction. It is not the intent of Drawings or specifications to repeat requirements of codes except where necessary for clarity.

1.05 DRAWINGS

- A. Examine Contract Documents prior to bidding of work and report discrepancies in writing to Architect.
- B. Drawings showing location of equipment and materials are diagrammatic and job conditions will not always permit installation in location shown. The Plumbing Drawings show general

arrangement of equipment and materials, etc., and shall be followed as closely as existing conditions, actual building construction, and work of other trades permit.

1. Architectural and Structural Drawings shall be considered part of the Work. These Drawings furnish Contractor with information relating to design and construction of the Project. Architectural Drawings take precedence over Plumbing Drawings.
 2. Because of the small scale of Plumbing Drawings, not all offsets, fittings, and accessories required are shown. Investigate structural and finish conditions affecting the Work and arrange Work accordingly. Provide offsets, fittings, and accessories required to meet conditions. Inform Architect immediately when job conditions do not permit installation of equipment and materials in the locations shown. Obtain the Architects approval prior to relocation of equipment and materials.
 3. Relocate equipment and materials installed without prior approval of the Architect. Remove and relocate equipment and materials at Contractors' expense upon Architects' direction.
 4. Minor changes in locations of equipment, piping, etc., from locations shown shall be made when directed by the Architect at no additional cost to the Owner providing such change is ordered before such items of work, or work directly connected to same are installed and providing no additional material is required.
- C. Execute work mentioned in Specifications and not shown on Drawings, or vice versa, the same as if specifically mentioned or shown in both.

1.06 FEES AND PERMITS

- A. Obtain and pay for all permits and service required in installation of this work; arrange for required inspections and secure approvals from authorities having jurisdiction. Comply with requirements of Division 01.
- B. Arrange for utility connections and pay charges incurred, including excess service charges.
 1. Bear the cost of construction related to utility services, from point of connection to utility services shown on Contract Documents. This includes piping, excavation, backfill, meters, boxes, check valves, backflow prevention devices, general service valves, concrete work, and the like, whether or not Work is performed by Contractor, local water/sanitation district, public utility, other governmental agencies or agencies' assigns.
- C. Prior to the start of construction, contact local gas company representative and coordinate location of gas meter and piping. In addition, coordinate time required for installation, in order to avoid delay to the Project.
- D. Obtain permits to operate compressed air tanks required to be furnished under this Work. Pay costs, and perform tests required to obtain permits. Post permits under glass in a conspicuous place on or near tanks, or as required by authorities having jurisdiction.
- E. Coordination:
 1. General:
 - a. Coordinate plumbing Work with trades covered in other Specifications Sections to provide a complete, operable and sanitary installation of the highest quality workmanship.

2. Electrical Coordination:
 - a. Refer to the Electrical Drawings and Specifications, Division 26, for service voltage and power feed wiring for equipment specified under this section. Contractor has full responsibility for the following items of work:
 - 1) Review the Electrical Drawings and Division 26 Specifications to verify that electrical services provided are adequate and compatible with equipment requirements.
 - 2) If additional electrical services are required above that indicated on Electrical Drawings and in Division 26, such as more control interlock conductors, larger feeder, or separate 120 volt control power source, include cost to furnish and install additional electrical services as part of the bid.
 - 3) Prior to proceeding with installation of additional electrical work, submit detailed drawings indicating exact scope of additional electrical work.
3. Mechanical Coordination:
 - a. Arrange for pipe spaces, chases, slots and openings in building structure during progress of construction, to accommodate mechanical system installation.
 - b. Coordinate installation of supporting devices. Set sleeves in poured-in-place concrete and other structural components during progress of construction.
 - c. Coordinate requirements for access panels and doors for mechanical items requiring access where concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."
 - d. Coordinate with other trades equipment locations, pipe, duct and conduit runs, electrical outlets and fixtures, air inlets and outlets, and structural and architectural features. Provide information on location of piping and seismic bracing to other trades as required for a completely coordinated project.

1.07 SUBMITTALS - GENERAL

- A. Refer to Division 01 Submittals Section(s) for additional requirements.
- B. Submittal packages may be submitted via email as PDF electronic files, or as printed packages. PDFs shall be legible at actual size (100 percent). Provide seven copies of printed submittal packages.
- C. Provide submittal of materials proposed for use as part of this Project. Product names in Specifications and on Drawings are used as standards of quality. Furnish standard items on specified equipment at no extra cost to the Contract regardless of disposition of submittal data. Other materials or methods shall not be used unless approved in writing by Architect. Architect's review will be required even though "or equal" or synonymous terms are used.
 1. Partial or incomplete submittals will not be considered.
 2. Quantities are Contractor's responsibility and will not be reviewed.
 3. Provide materials of the same brand or manufacturer for each class of equipment or material.

4. Identify each item by manufacturer, brand, trade name, number, size, rating, or other data necessary to properly identify and review materials and equipment. Words "as specified" are not sufficient identification.
5. Identify each submittal item by reference to items' Specification Section number and paragraph, by Drawing and detail number, and by unit tag number.
6. Organize submittals in same sequence as in Specification Sections.
7. Show physical arrangement, construction details, finishes, materials used in fabrications, provisions for piping entrance, access requirements for installation and maintenance, physical size, mechanical characteristics, foundation and support details, and weight.
 - a. Submit Shop Drawings, performance curves, and other pertinent data, showing size and capacity of proposed materials.
 - b. Specifically indicate, by drawn detail or note, that equipment complies with each specifically stated requirement of Contract Documents.
 - c. Drawings shall be drawn to scale and dimensioned (except schematic diagrams). Drawings may be prepared by vendor but must be submitted as instruments of Contractor, thoroughly checked and signed by Contractor before submission to Architect for review.
 - d. Catalog cuts and published material may be included with supplemental scaled drawings.
- D. Review of submittals will be only for general conformance with design concept and general compliance with information given in Contract Documents. Review will not include quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with work of other trades, or construction safety precautions, which are sole responsibility of Contractor. Review of a component of an assembly does not indicate acceptance of an assembly. Deviations from Contract Documents not clearly identified by Contractor are Contractor's responsibility and will not be reviewed by Architect.
- E. Within reasonable time after award of contract and in ample time to avoid delay of construction, submit to Architect Shop Drawings or submittals on all items of equipment and materials provided. Provide submittal in at least seven copies and in complete package.
 1. Shop Drawings and submittals shall include Specification Section, Paragraph number, and Drawing unit symbol or detail number for reference. Organize submittals into booklets for each Specification section and submit in loose-leaf binders with index. Deviations from the Contract Documents shall be prominently displayed in the front of the submittal package and referenced to the applicable Contract requirement.
- F. Furnish to the Project Inspector complete installation instructions on material and equipment before starting installation.

1.08 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing systems materials and products.
- B. Shop Drawings.

- C. Sustainable Design Submittals:
1. Product Data: For adhesives and sealants, documentation of compliance including printed statement of VOC content and chemical components.
 2. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
- D. Pipe, pipe or plumbing fittings, fixtures, solder and flux installed in a system providing water for human consumption shall comply with lead free requirements of the California Health and Safety Code Section 11 68 75. Provide submittal information for products third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.
- E. Delegated-Design Submittals: For seismic supports, anchorages, restraints, and vibration isolators indicated to comply with performance requirements and design criteria.
1. Calculations performed for use in selection of seismic supports, anchorages, and restraints shall utilize criteria indicated in Structural Contract Documents.
 2. Include design calculations and details for selecting vibration isolators and vibration isolation bases complying with performance requirements, design criteria, and analysis data signed and sealed by the California registered structural engineer responsible for their preparation.
 3. Supports, anchorages and restraints for piping, ductwork, and equipment shall be an HCAI pre-approved system such as TOLCO, ISAT, Mason, or equal. Pipes, ducts and equipment shall be seismically restrained in accordance with requirements of current edition of California Building Code. System shall have current OPM number and shall meet additional requirements of authority having jurisdiction. Provide supporting documentation required by the reviewing authority and the Architect and Engineer. Provide layout drawings showing piping, ductwork and restraint locations.
 - a. Bracing of Piping and Equipment: Specifically state how bracing attachment to structure is accomplished. Provide shop drawings indicating seismic restraints, including details of anchorage to building. In-line equipment must be braced independently of piping, and in conformance with applicable building codes. Provide calculations to show that pre-approval numbers have been correctly applied in accordance with general information notes of pre-approval documentation. Gas pipe bracing shall be designed in accordance with California Building Code Section 1615A.1.22 and ASCE 7-10 Section 13.6. Coefficient $I_p = 1.5$ shall be used for gas piping bracing calculations.
 - b. In lieu of the above or for non-standard installations not covered in the above pre-approved systems, Contractor shall provide layout drawings showing piping, ductwork, and restraint locations, and detail supports, attachments and restraints, and furnish supporting calculations and legible details sealed by a California registered structural engineer, in accordance with 2016 California Building Code
 4. Additional Requirements: In addition to the above, conform to all state and local requirements.

1.09 INFORMATIONAL SUBMITTALS

- A. Provide layouts for plumbing systems, for inclusion in coordinated layout specified in Section 23 80 00. Comply with requirements for layouts specified in Section 23 80 00.

1.10 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:

1. Refer to Division 01 for complete instructions.
2. Furnish three complete sets of Operation and Maintenance Manual bound in hardboard binder, and one compact disc containing complete Operation and Maintenance Manual in searchable PDF format. Provide Table of Contents. Provide index tabs for each piece of equipment in binder and disc. Begin compiling data upon approval of submittals.
 - a. Sets shall incorporate the following:
 - 1) Product Data.
 - 2) Shop Drawings.
 - 3) Record Drawings.
 - 4) Service telephone number, address and contact person for each category of equipment or system.
 - 5) Complete operating and maintenance instructions for each item of plumbing equipment and systems.
 - 6) Copies of guarantees/warrantees for each item of equipment and systems.
 - 7) Test data and system balancing reports.
 - 8) Typewritten maintenance instructions for each item of equipment listing lubricants to be used, frequency of lubrication, inspections required, adjustment, etc.
 - 9) Manufacturers' bulletins with parts numbers, instructions, etc., for each item of equipment.
 - 10) Control diagrams and literature.
 - 11) A complete list or schedule of all scheduled valves giving the number of the valve, location and the rooms or area controlled by the valve. Identify each valve with a permanently attached metal tag stamped with number to match schedule. Post list in frame under plastic on wall in mechanical room or where directed by Architect.
 - 12) Check test and start reports for each piece of plumbing equipment provided as part of the Work.
 - 13) Commissioning and Preliminary Operation Tests required as part of the Work.
 - b. Post service telephone numbers and/or addresses in an appropriate place as designated by the Architect.

B. Record Drawings:

1. Refer to Division 01, Record Documents, for requirements governing Work specified herein.
2. Upon completion of the work, deliver to Architect the following:
 - a. Originals of drawings showing the Work exactly as installed.
 - b. One complete set of reproducible drawings showing the Work exactly as installed.
 - c. One compact disc with complete set of drawings in PDF format showing the Work exactly as installed.
 - d. Provide Contractor's signature, verifying accuracy of record drawings.
 - e. Obtain the signature of the Project Inspector for all record drawings.

1.11 SUBSTITUTIONS

- A. Refer to Division 01 for complete instructions. Requirements given below are in addition to or are intended to amplify Division 01 requirements. In the case of conflict between requirements given herein and those of Division 01, Division 01 requirements shall apply.
- B. It is the responsibility of Contractor to assume costs incurred because of additional work and or changes required to incorporate proposed substitute into the Project. Refer to Division 01 for complete instructions.
- C. Substitutions will be interpreted to be all manufacturers other than those specifically listed in the Contract Documents by brand name, model or catalog number.
- D. Only one request for substitution will be considered for each item of equipment or material.
- E. Substitution requests shall include the following:
 1. Reason for substitution request.
 2. Complete submittal information as described herein; see "Submittals."
 3. Coordinated scale layout drawings depicting position of substituted equipment in relation to other work, with required clearances for operation, maintenance and replacement.
 4. List optional features required for substituted equipment to meet functional requirements of the system as indicated in Contract Documents.
 5. Explanation of impact on connected utilities.
 6. Explanation of impact on structural supports.
- F. Installation of reviewed substitution is the Contractors' responsibility. Any mechanical, electrical, structural, or other changes required for installation of reviewed substituted equipment or material must be made by the Contractor without additional cost to the Owner. Review by the Architect of the substituted equipment or material, including dimensioned Drawings will not waive these requirements.

- G. Contractor may be required to compensate the Architect for costs related to substituted equipment or material.

1.12 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of plumbing systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with plumbing systems work similar to that required for this Project.
- C. California Health and Safety Code Compliance: For products covered under the scope of HSC 116875 for potable water service. Products for potable water service shall be third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.
- D. Comply with applicable portions of California Plumbing Code pertaining to selection and installation of plumbing materials and products.
- E. All materials and products shall be new and shall match existing.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Protect equipment and piping delivered to Project site from weather, humidity and temperature variations, dirt, dust and other contaminants.

1.14 FIELD CONDITIONS

- A. Contractor shall visit Project site and examine existing conditions in order to become familiar with Project scope. Verify dimensions shown on Drawings at Project site. Bring discrepancies to the attention of Architect. Failure to examine Project site shall not constitute basis for claims for additional work because of lack of knowledge or location of hidden conditions that affect Project scope.
- B. Information on Drawings relative to existing conditions is approximate. Deviations from Drawings necessary during progress of construction to conform to actual conditions shall be approved by the Architect and shall be made without additional cost to the Owner. The Contractor shall be held responsible for damage caused to existing services. Promptly notify the Architect if services are found which are not shown on Drawings.

1.15 WARRANTY

- A. Refer to Division 01 for warranty requirements, and duration and effective date of Contractor's Standard Guarantee.
- B. Repair or replace defective work, material, or part that appears within the warranty period, including damage caused by leaks.
- C. On failure to comply with the warranty requirements within a reasonable length of time after notification is given, the Architect/Owner shall have the repairs made at the Contractor's expense.

PART 2 - PRODUCTS**2.01 GENERAL**

- A. Materials or equipment of the same type shall be of the same brand wherever possible. All materials shall be new and in first class condition.
- B. All sizes, capacities, and efficiency ratings shown are minimum, except that gas capacity is maximum available.
- C. Refer to Sections 22 10 00 and 23 80 00 for specific system piping materials.

2.02 MATERIALS AND PRODUCTS

- A. No material installed as part of this Work shall contain asbestos.
- B. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.03 STRAINERS FOR POTABLE WATER SYSTEMS

- A. Strainers: Full line size, conforming to lead-free requirements of California Health and safety Code Section 11 68 75. "Y" pattern, 125 psi SWP minimum, with 304 stainless steel screens. Install all strainers with a blow-off hose valve with hose adapter. Strainer shall have gasketed cover with straight thread.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. 3 inches and smaller: bronze or brass body, threaded ends, with 20 mesh screen. Watts LF777SI, Wilkins SXL.

2.04 STRAINERS FOR NON-POTABLE WATER SYSTEMS

- A. Charles M. Bailey #100A, Armstrong, Muessco, or equal, Fig. 11 "Y" pattern, 125 psi WP minimum, with monel screens with 20 square mesh for 2 inches and smaller and 3/64 inch perforations for 2-1/2 inches and larger. Install all strainers with a blow-off hose valve with hose adapter. Strainer shall have gasketed cover with straight thread.

2.05 VALVE BOXES

- A. General:
 - 1. Where several valves or other equipment are grouped together, provide larger boxes of rectangular "vault" type adequately sized for condition and similar in construction to those specified above.
 - 2. Provide valve box extensions as required to set bottom of valve box tight up to top of piping in which valve is installed.
 - 3. Provide a tee handle wrench for each size, Alhambra Foundry Co. #A-3008, or equal.

2.06 GAUGES

- A. Marsh "Series J", U.S. Gage, Danton 800, or equal, with bronze bushed movement and front recalibration. Dials shall be white with black numerals, 3-1/2 inch dial face. Normal reading shall be at mid-scale. Provide a needle valve on each gauge connection. Supply a gauge piped with branch isolation valves across the inlet and outlet of each pump and where shown on the Drawings.
- B. Provide Pete's Plug II, Sisco P/T, or equal, test plug with Nordel core {and gasketed cap}, on inlet and outlet of each coil, boiler, condenser, chiller and heat exchanger and where shown on Drawings.

2.07 THERMOMETERS

- A. Marsh, Taylor, Palmer, or equal, 5 inch diameter bimetal dial, adjustable from face, with adjustable positioner, located to be easily read from normal personnel approach. Normal reading shall be at mid-scale.
 - 1. Provide extension for insulation.
 - 2. Provide thermometers with steel bulb chambers and brass separable sockets.
- B. Provide Pete's Plug II, Sisco P/T, or equal, test plug with Nordel core, on inlet and outlet of each coil, boiler, and heat exchanger and provide two digital electronic test thermometers for each range of fluid temperature and where shown on Drawings.

2.08 ACCESS DOORS

- A. Where floors, walls, or ceilings must be penetrated for access to mechanical equipment, provide access doors, 14 inch by 14 inch minimum size in usable opening. Where entrance of a serviceman may be required, provide 20 inch by 30 inch minimum usable opening. Locate access doors/panels for non-obstructed and easy reach.
 - 1. All access doors less than 7'-0" above floors and exposed to public access shall have keyed locks.
- B. Access doors shall match those supplied in Division 08 in all respects, except as noted herein.
- C. Provide stainless steel access doors for use in toilet rooms, shower rooms, kitchens and other damp areas. Provide steel access doors with prime coat of baked-on paint for all other areas.
- D. Do not locate access doors in highly visible public areas such as lobbies, waiting areas, and primary entrance areas. Coordinate with the Architect when access is required in these areas.
- E. Where specific information or details relating to access panels different from the above is shown or given on the Drawings or other Divisions of work, then that information shall supersede this specification.
- F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products which may be incorporated into the Work include Milcor, Karp, Nystrom, or Cesco, equal to the following:
 - 1. Milcor

- a. Style K (plaster).
- b. Style DW (gypsum board).
- c. Style M (Masonry).
- d. Style "Fire Rated" where required.

2.09 FLEXIBLE JOINTS

- A. Where indicated on Drawings, provide Metraflex Metrasphere, Style R, Mason Industries, or equal, Spherical Expansion Joints. Provide control units at each expansion joint, arranged to limit both expansion and compression.

2.10 PIPE GUIDES

- A. Where flexible connections are indicated on Drawings, provide Metraflex style IV, B-Line, or equal, pipe guides in locations recommended by manufacturer. Maximum spacing from flexible connection to first pipe guide is 4 pipe diameters, and maximum spacing from second pipe guide is 14 pipe diameters.

2.11 EQUIPMENT IDENTIFICATION

- A. Identify each piece of equipment with a permanently attached engraved bakelite plate, 1/2 inch high white letters on black background.

2.12 PIPE IDENTIFICATION

- A. Identify each piping system and indicate the direction of flow by means of Seton, Inc., Marking Services Inc., Reef Industries, Inc., or equal, pre-tensioned, coiled semi-rigid plastic pipe labels formed to circumference of pipe, requiring no fasteners or adhesive for attachment to pipe.
- B. The legends and flow arrows shall conform to ASME A13.1.

2.13 INSULATION WORK

- A. General:
 1. For insulating domestic hot water pumps, refer to Section 22 50 00, Plumbing Equipment,
 2. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).
 3. Adhesives and sealants shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.
 4. The term "piping" used herein includes pipe, valves, strainers and fittings.
 5. Apply insulating cement to fittings, valves and strainers and trowel smooth to the thickness of adjacent covering. Cover with jacket to match piping. Extend covering on valves up to the bonnet. Leave strainer cleanout plugs accessible.
 6. Provide pre-formed PVC valve and fitting covers.

7. Provide Calcium Silicate rigid insulation and sheet metal sleeve, 18 inch minimum length at each pipe hanger. Seal ends of insulation to make vapor tight with jacket.
8. Test insulation, jackets and lap-seal adhesives as a composite product and confirm flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with UL723 or ASTM E84.
9. Clean thoroughly, test and have approved, all piping and equipment before installing insulation and/or covering.
10. Repair all damage to existing pipe and equipment insulation whether or not caused during the work of this contract, to match existing adjacent insulation for thickness and finish, but conforming to flame spread and smoke ratings specified above.

B. Insulation of Piping:

1. Insulate domestic hot and tempered water with minimum 3-1/2 pounds per cubic foot density fiberglass with ASJ-SSL jacket. Insulation thickness shall be the following:
 - a. Pipe 3/4 inches and smaller: 1 inch thick.
 - b. Pipe 1 inch through 1-1/2 inches: 1-1/2 inches thick.
 - c. Pipe 2 inches and larger: 2 inches thick.
2. Insulate domestic hot water piping under slab on grade with Owens Corning Foamglas, preformed pipe insulation, or equal. Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Cover pipe and fittings with insulation manufacturer's recommended jacketing. Insulation thickness shall be the following:
 - a. Pipe 3/4 inches and smaller: 2 inches thick.
 - b. Pipe 1 inch and larger: 3 inches thick.
3. Insulate domestic cold water piping located within building, outside of insulation envelope in outside walls, vented attic spaces, and unheated spaces, including equipment rooms and below raised floor with 1 inch thick molded fiberglass, minimum 3-1/2 pound per cubic foot density, with ASJ-SSL jacket.
4. Insulate domestic cold water piping located outside building exposed to weather with minimum 3-1/2 pounds per cubic foot density fiberglass with ASJ-SSL jacket. Insulation thickness for all pipe sizes: 2 inches.
5. Exposed insulated piping within the building shall have a Zeston 2000 25/50, Proto Lo-Smoke, or equal, PVC jacket and fitting cover installed over the insulation, applied per manufacturer's instructions. Insulation shall be vapor tight before applying PVC jacket and fitting covers. Verify suitability with manufacturer of insulation. Insulation with pre-applied polymer jacket may be substituted at Contractor's option.

PART 3 - EXECUTION**3.01 EXISTING MATERIALS**

- A. Remove existing equipment, piping, wiring, construction, etc., which interferes with Work of this Contract. Promptly return to service upon completion of work in the area. Replace items damaged by Contractor with new material to match existing.
- B. Removed materials which will not be re-installed and which are not claimed by Owner shall become property of Contractor and shall be removed from Project site. Consult Owner before removing any material from Project site. Carefully remove materials claimed by Owner to prevent damage and deliver to Owner-designated storage location.
- C. Existing piping and wiring not reused and are concealed in building construction may be abandoned in place and all ends shall be capped or plugged. Remove unused piping and wiring exposed in Equipment Rooms or occupied spaces. Material shall be removed from Project premises. Disconnect power, water, gas, pump or any other active energy source from piping or electrical service prior to abandoning in place.
- D. Existing piping, ductwork, and equipment modified or altered as part of this Work shall comply with the most recent applicable code requirements.

3.02 FRAMING, CUTTING AND PATCHING

- A. Special framing, recesses, chases and backing for Work of this Section, unless otherwise specified, are covered under other Specification Sections.
- B. Contractor is responsible for placement of pipe sleeves, hangers, inserts, supports, and location of openings for the Work.
- C. Cutting, patching, and repairing of existing construction to permit installation of equipment, and materials is the responsibility of Contractor. Repair or replace damage to existing work with skilled mechanics for each trade.
- D. Cut existing concrete construction with a concrete saw. Do not utilize pneumatic devices.
- E. Core openings through existing construction for passage of new piping and conduits. Cut holes of minimum diameter to suit size of pipe and associated insulation installed. Coordinate with building structure, and obtain Structural Engineer's approval prior to coring through existing construction.

3.03 PLUMBING DEMOLITION

- A. Refer to Division 01 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, dismantle and remove mechanical systems, equipment, and components indicated to be removed. Coordinate with all other trades.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping to remain with same or compatible piping material. Refrigerant system must be evacuated per EPA requirements.

3. Equipment to Be Removed: Drain down and cap remaining services and remove equipment.
 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.04 ELECTRICAL REQUIREMENTS

- A. Provide adequate working space around electrical equipment in compliance with the California Electrical Code. Coordinate the Mechanical Work with the Electrical Work to comply.
- B. Furnish necessary control diagrams and instructions for the controls. Before permitting operation of any equipment which is furnished, installed, or modified under this Section, review all associated electrical work, including overload protection devices, and assume complete responsibility for the correctness of the electrical connections and protective devices. Motors and control equipment shall conform to the Standards of the National Electrical Manufacturers' Association. All equipment and connections exposed to the weather shall be NEMA IIIR with factory-wired strip heaters in each starter enclosure and temperature control panel where required to inhibit condensation.
- C. All line voltage and low voltage wiring and conduit associated with the Temperature Control System are included in this Section. Wiring and conduit shall comply with Division 26.

3.05 PIPING SYSTEM REQUIREMENTS

- A. Drawing plans, schematic and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

3.06 PRIMING AND PAINTING

- A. Perform priming and painting on the equipment and materials as specified herein.
- B. See Division 09 Painting Section(s) for detailed requirements.
- C. Priming and Painting:
 1. Exposed ferrous metals, including piping, which are not galvanized or factory-finished shall be primed and painted.
 - a. Black Steel Piping:
 - 1) Primer: One coat gray Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, comparable products by Rust-Oleum, Kelly Moore, or equal.

- 2) Topcoat: Two coats gray Sherwin-Williams Pro Industrial Waterbased Alkyd Urethane Enamel, comparable products by Rust-Oleum, Kelly Moore, or equal.
2. Metal surfaces of items to be jacketed or insulated except piping shall be given two coats of primer unless furnished with equivalent factory finish. Items to be primed shall be properly cleaned by effective means free of rust, dirt, scale, grease and other deleterious matter and then primed with the best available grade of zinc rich primer. After erection or installation, all primed surfaces shall be properly cleaned of any foreign or deleterious matter that might impair proper bonding of subsequent paint coatings. Any abrasion or other damage to the shop or field prime coat shall be properly repaired and touched up with the same material used for the original priming.
3. Where equipment is provided with nameplate data, the nameplate shall be masked off prior to painting. When painting is completed, remove masking material.

3.07 EXCAVATING

- A. Perform all excavating required for work of this Section. Provide the services of a pipe/cable locating service prior to excavating activities to determine location of existing utilities.
- B. Unless shown otherwise, provide a minimum of 2'-6" cover above top of pipe to finished grade for all service piping, unless otherwise noted. Trim trench bottom by hand or provide a 4 inch deep minimum bed of sand to provide a uniform grade and firm support throughout entire length of pipe. For all PVC pipe and for PE gas pipe, bed the pipe in 4 inch sand bed. Pipe bedding materials should be clean crushed rock, gravel or sand of which 100 percent will pass a 1 inch sieve. For pipes that are larger than 10 inches in diameter, at least 95 percent should pass a 3/4 inch sieve, and for pipes 10 inches in diameter or smaller, 100 percent should pass a 1/2 inch sieve. All other materials should have a minimum sand equivalent of 50. Only a small proportion of the native soils will meet these requirements without extensive processing; therefore, importation of pipe bedding materials should be anticipated. Pipe bedding materials shall be compacted in lifts not exceeding 6 inches in compacted thickness. Each lift shall be compacted to not less than 90 percent relative compaction at or above the optimum moisture content, in accordance with ASTM Specification D2940, except that bedding materials graded such that 100 percent of the material will pass a No. 200 sieve shall be compacted in 6 inch lifts using a single pass of a flat-plate, vibratory compactor or vibratory drum. Pipe bedding materials should extend at least to the spring line.
- C. Maintain all warning signs, barricades, flares, and red lanterns as required.
- D. For all trenches 5 feet or more in depth, submit copy of permit detailed drawings showing shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trenches. Obtain a permit from the Division of Industrial Safety prior to beginning excavations. A copy of the permit shall be available at the site at all times.

3.08 BACKFILLING

- A. Backfill shall comply with applicable provisions of Division 31 of these Specifications.
- B. Except under existing or proposed paved areas, walks, roads, or similar surfaces, backfill for other types of pipe shall be made using suitable excavated material or other approved material. Place backfill in 8 inch layers, measured before compaction, and compact with impact hammer to at least 90 percent relative compaction per ASTM D2940.

1. Backfill plastic pipe and insulated pipe with sand for a minimum distance of 12 inches above the top of the pipe. Compact using mechanical tamping equipment.
- C. Entire backfill for excavations under existing or proposed pavements, walks, roads, or similar surfaces, under new slabs on grade, shall be made with clean sand compacted with mechanical tamping equipment vibrator to at least 90 percent relative compaction per ASTM D2940. Remove excess earth. Increase the minimum compaction within the uppermost two feet of backfill to 95 percent.
- D. Replace or repair to its original condition all sod, concrete, asphalt paving, or other materials disturbed by the trenching operation. Repair within the guarantee period as required.

3.09 PIPING SYSTEMS INSTALLATION

- A. At time of final connection, and prior to opening valve to allow pressurization of water and gas piping from existing systems, on site or off site, perform a pressure test to indicate static pressure of existing systems. If pressure on water piping is greater than 80 psi, or gas pressure is not as indicated on Contract Documents, inform Architect immediately. Do not allow piping systems to be pressurized without written consent of the Architect.
- B. General:
 1. All piping shall be concealed unless shown or otherwise directed. Allow sufficient space for ceiling panel removal.
 2. Installation of piping shall be made with appropriate fittings. Bending of piping will not be accepted.
 3. Install piping to permit application of insulation and to allow valve servicing.
 4. Where piping or conduit is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.
 5. Horizontal runs of pipes and/or electrical conduit suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect.
 6. Close ends of pipe immediately after installation. Leave closure in place until removal is necessary for completion of installation.
 7. Each piping system shall be thoroughly flushed and proved clean before connection to equipment.
 8. Pipe the discharge of each relief valve, air vent, backflow preventer, and similar device to floor sink or drain.
 9. Install exposed polished or enameled connections with special care showing no tool marks or threads at fittings.
 10. Install horizontal valves with valve stem above horizontal.
 11. Use reducing fittings; bushings shall not be allowed. Use eccentric reducing fittings wherever necessary to provide free drainage of lines and passage of air.
 12. Verify final equipment locations for roughing-in.

13. Service Markers: Mark the location of each plugged or capped pipe with a 4 inch round by 30 inch long concrete marker, set flush with finish grade. Provide 2-1/2 inch diameter engraved brass plate as part of monument marker.
 14. Furnish and install anchors or thrust blocks on PVC water lines in the ground, at all changes in direction of piping, and at all connections or branches from mains 1-1/2 inch and larger. Form anchors or thrust blocks by pouring concrete between pipe and trench wall. Thrust blocks shall be of adequate size and so placed as to take thrusts created by maximum internal water pressure. Sizing and placement shall be per manufacturer's recommendations, CPC, and IAPMO installation standards. Anchor piping to building construction.
 15. Sanitary Sewer and Storm Drain: Grade piping inside building uniformly 1/4 inch per foot if possible but not less than 1/8 inch per foot. Run piping as straight as possible. Make piping connections between building piping and outside service pipe with cast iron reducers or increasers. Slope sewers uniformly between given elevations where invert elevations are shown.
 16. Where piping is installed in walls within one inch of the face of stud, provide a 16 gauge sheet metal shield plate on the face of the stud. The shield plate shall extend a minimum of 1-1/2 inches beyond the outside diameter of the pipe.
- C. Sleeves:
1. Install Adjus-to-Crete, Pipeline Seal and Insulator, or equal, pipe sleeves of sufficient size to allow for free motion of pipe, 24 gauge galvanized steel. The space between pipe and sleeves through floor slabs on ground, through outside walls above or below grade, through roof, and other locations as directed shall be caulked with oakum and mastic and made watertight. The space between pipe and sleeve and between sleeve and slab or wall shall be sealed watertight.
 2. At Contractor's option, Link-Seal, Metraflex Metraseal, or equal, casing seals may be used in lieu of caulking. Wrap pipes through slabs on grade with 1 inch thick fiberglass insulation to completely isolate the pipe from the concrete.
- D. Floor, Wall, and Ceiling Plates:
1. Fit all pipes with or without insulation passing through walls, floors, or ceilings, and all hanger rods penetrating finished ceilings with chrome-plated or stainless escutcheon plates.
- E. Firestopping:
1. Pack the annular space between the pipe sleeves and the pipe through all floors and walls with UL listed fire stop, and sealed at the ends. All pipe penetrations shall be UL listed, Hilti, 3M Pro-Set, or equal.
 - a. Install fire caulking behind mechanical services installed within fire rated walls, to maintain continuous rating of wall construction.
 2. Provide SpecSeal Systems UL fire rated sleeve/coupling penetrators for each pipe penetration or fixture opening passing through floors, walls, partitions or floor/ceiling assemblies. All Penetrators shall comply with UL Fire Resistance Directory (Latest Edition), and in accordance with Chapter 7, CBC requirements.

3. Sleeve penetrators shall have a built in anchor ring for waterproofing and anchoring into concrete pours or use the special fit cored hole penetrator for cored holes.
4. Copper and steel piping shall have SpecSeal plugs on both sides of the penetrator to reduce noise and to provide waterproofing.
5. All above Systems to be installed in strict accordance with manufacturer's instructions.
6. Alternate firestopping systems are acceptable if approved equal. However, any deviation from the above specification requires the Contractor to be responsible for determining the suitability of the proposed products and their intended use, and the Contractor shall assume all risks and liabilities whatsoever in connection therewith.

F. Hangers and Supports:

1. General: Support equipment and piping so that it is firmly held in place by approved iron hangers and supports and special hangers. Hanger and support components shall support weight of equipment and pipe, fluid, and pipe insulation based on spacing between supports with minimum factor of safety of five based on ultimate strength of material used. Do not exceed manufacturer's load rating. Pipe attachments or hangers, of same size as pipe or tubing on which used, or nearest available. Rigidly fasten hose faucets, fixture stops, compressed air outlets, and similar items to the building construction. The Architect shall approve hanger material before installation. Do not support piping with plumbers' tape, wire rope, wood, or other makeshift devices. Where building structural members do not match piping support spacing, provide "bridging" support members firmly attached to building structural members in a fashion approved by the structural engineer.
 - a. Materials, design, and type numbers per Manufacturers' Standardization Society (MSS), Standard Practice (SP)-58.
 - 1) Provide copper-plated or felt-lined hangers for use on copper tubing.
2. Hanger components shall be provided by one manufacturer: B-Line, Grinnell, Unistrut, Badger, or equal.
3. Riser clamps: B-line model B3373, or equal.
4. Pipe Hanger and Support Placement and Spacing:
 - a. Vertical piping support spacing: Provide riser clamps for piping, above each floor, in contact with the floor. Provide support at joints, branches, and horizontal offsets. Provide additional support for vertical piping, spaced at or within the following maximum limits:

<u>Pipe Diameter</u>	<u>Steel Threaded or Welded (Note 3)</u>	<u>Steel Gas</u>	<u>Copper Brazed or Soldered (Note 3)</u>	<u>CPVC & PVC (Note 2)</u>
1/2 - 1"	12 ft.	6 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)
1-1/4 - 2"	12 ft.	Each Floor, Not to Exceed 10 ft.	Each Floor, Not to Exceed 10 ft..	Base and Each Floor (Note 1)
2-1/2 - 3"	12 ft.	Each Floor, Not to Exceed 10 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)
Over 4"	12 ft.	Each Floor, Not to Exceed 10 ft.	Each Floor, Not to Exceed 10 ft.	Base and Each Floor (Note 1)

- 1) Note 1: Provide mid-story guides.
 - 2) Note 2: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard. For CPVC piping, provide for expansion per IAPMO installation standard.
 - 3) Note 3: Spacing of hangers and supports for piping assembled with mechanical joints shall be in accordance with standards acceptable to authorities having jurisdiction.
- b. Vertical cast iron piping support spacing: Base and each floor not to exceed 15 feet.
- c. Horizontal piping, hanger and support spacing: Locate hangers and supports at each change of direction, within one foot of elbow, and spaced at or within following maximum limits:

<u>Pipe Diameter</u>	<u>Steel Threaded or Welded (Note 2)</u>	<u>Steel Gas</u>	<u>Copper Brazed or Soldered (Notes 2, 3)</u>	<u>CPVC & PVC (Note 1)</u>
1/2 - 1"	6 ft.	6 ft.	5 ft.	3 ft.
1-1/4 - 2"	7 ft.	10 ft.	6 ft.	4 ft.
2-1/2 - 3"	10 ft.	10 ft.	10 ft.	4 ft.
Over 4"	10 ft.	10 ft.	10 ft.	4 ft.

- 1) Note 1: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard. For CPVC piping, provide for expansion per IAPMO installation standard.
- 2) Note 2: Spacing of hangers and supports for piping assembled with mechanical joints shall be in accordance with standards acceptable to authorities having jurisdiction.
- 3) Note 3: Includes all refrigerant piping, including vapor and hot gas pipes.
- d. Horizontal cast iron piping support spacing:
 - 1) Support piping at every other joint for piping length of less than 4 feet.
 - 2) For piping longer than 4 feet, provide support on each side of the coupling, within 18 inches of each joint.
 - 3) Hanger shall not be installed on the coupling.
 - 4) Provide support at each horizontal branch connection.
 - 5) Provide sway brace at 40 foot maximum spacing for suspended pipe with no-hub joints, except where a lesser spacing is required by the seismic design criteria used in delegated design for seismic systems. Refer to Article, Submittals.
 - 6) Provide a brace on each side of a change in direction of 90 degrees or more.
- 5. Suspended Piping:
 - a. Individually suspended piping: B-Line B3690 J-Hanger or B3100 Clevis, complete with threaded rod, or equal. All hangers on supply and return piping handling heating hot water or steam shall have a swing connector at point of support.

<u>Pipe Size</u>	<u>Rod Size Diameter</u>
2" and Smaller	3/8"
2-1/2" to 3-1/2"	1/2"
4" to 5"	5/8"
6"	3/4"

- b. Trapeze Suspension: B-Line 1-5/8 inch width channel in accordance with manufacturer's published load ratings. No deflection to exceed 1/180 of a span.
- c. Trapeze Supporting Rods: Shall have a safety factor of five; securely anchor to building structure.
- d. Pipe Clamps and Straps: B-Line B2000, B2400; isolate copper pipe with two thicknesses of 2 inches wide 10-mil polyvinyl tape. Where used for seismic support systems, provide B-Line B2400 series pipe straps.

- e. Concrete Inserts: B-line B22-I continuous insert or B2500 spot insert. Do not use actuated fasteners for support of overhead piping unless approved by Architect.

6. Support to Structure:

- a. Wood Structure: Provide and install wood blocking as required to suit structure. Provide lag screws or through bolts with length to suit requirements, and with size (diameter) to match the size of hanger rods required.
 - 1) Do not install Lag screws in tension without written review and acceptance by Structural Engineer.

Side Beam Angle Clip	B-Line B3062---MSS Type 34
Side Beam Angle Clip	B-Line B3060
Ceiling Flange	B-Line B3199

- 2) Blocking for support of piping shall be not less than 2 inch thick for piping up to 2 inch size. Provide 3 inch blocking for piping up through 5 inch size, and 4 inch blocking for larger piping. Provide support for blocking in accordance with Structural Engineers requirements.
- 3) Where lag screws are used, length of screw shall be 1/2 inch less than the wood blocking. Pre-drill starter holes for each lag screw.

7. Rubber Neoprene Pipe Isolators:

- a. Pipe isolators shall comprise an internal rubber or neoprene material that isolates pipe from hanger and structure. Install at all piping located in acoustical walls. Refer to Architectural Drawings for location of acoustical walls.
- b. Isolation material shall be either a rubber or neoprene material that prevents contact between the pipe and the structure. The rubber shall have between a 45 to 55 durometer rating and a minimum thickness of 1/2 inch.
- c. Acceptable Suppliers:
 - 1) Vertical runs: Acousto-Plumb or equal.
 - 2) Horizontal runs: B-Line, Vibraclamp; Acousto-Plumb or equal.

- 8. Provide support for piping through roof, arranged to anchor piping solidly in place at the roof penetration.
- 9. Provide rigid insulation and a 12 inch long, 18 gauge galvanized sheet iron shield between the covering and the hanger whenever hangers are installed on the outside of the pipe covering.
- 10. Insulate copper tubing from ferrous materials and hangers with two thicknesses of 3 inch wide, 10 mil polyvinyl tape wrapped around pipe.
- 11. Provide a support or hanger close to each change of direction of pipe either horizontal or vertical and as near as possible to concentrated loads.

12. Suspend rods from concrete inserts with removable nuts where suspended from concrete decks. Power actuated inserts will not be allowed.

3.10 UNION AND FLANGE INSTALLATION

- A. Install Watts, Epco, Nibco, or equal, dielectric unions or flanges at points of connection between copper or brass piping or material and steel or cast iron pipe or material except in drain, waste, vent, or rainwater piping. Bushings or couplings shall not be used. Dielectric unions installed in potable water systems shall conform to the lead-free requirements of the California Health and Safety Code Section 11 68 75.
- B. Install unions in piping NPS 2" and smaller, and flanges in piping NPS 2-1/2" and larger whether shown or not at each connection to all equipment and tanks, and at all connections to all automatic valves, such as temperature control valves. Unions installed in potable water systems shall conform to the lead-free requirements of the California Health and Safety Code Section 11 68 75.
- C. Locate the unions for easy removal of the equipment, tank, or valve.

3.11 ACCESS DOOR INSTALLATION

- A. Furnish and install access doors wherever required whether shown or not for easy maintenance of mechanical systems; for example, at concealed valves, strainers, traps, cleanouts, dampers, motors, controls, operating equipment, etc. Access doors shall provide for complete removal and replacement of equipment.

3.12 CONCRETE WORK

- A. Concrete work required for work of this Section shall be included under another section of the Specification, unless otherwise noted, including poured-in-place concrete work for installing precast manholes, catch basins, etc., and shall include reinforced concrete bases for pumps, tanks, compressors, fan units, boilers, unless the work is specifically indicated on the Drawings to be furnished under this Section.
- B. Thrust blocks, underground anchors, and pads for cleanouts, valve access boxes and washer boxes are included under this Section of the Specification. Concrete shall be 3000 psi test minimum. Refer to Division 03 for concrete types.

3.13 PIPE PROTECTION

- A. Wrap bare galvanized and black steel pipe buried in the ground and to 6" above grade, including piping in conduit, with one of the following, or equal:
 1. Polyethylene Coating: Pressure sensitive polyethylene coating, "X-Tru-Coat" as manufactured by Pipe Line Service Corporation or "Green Line" wrap as manufactured by Royston Products, or equal.
 - a. Field Joints and Fittings: Protecto Wrap #1170 tape as manufactured by Pipe Line Service Corporation, or Primer #200 tape by Royston Products, or equal. Installation shall be as per manufacturer's recommendation and instructions.
 2. Tape Wrap: Pressure-sensitive polyvinyl chloride tape, "Transtex #V-10 or V-20", "Scotchwrap 50", Slipknot 100, PASCO Specialty & Mfg., Inc., or equal, with continuous identification. Tape shall be a minimum of 20 mils thick for fittings and irregular surfaces, two wraps, 50 percent overlap, 40 mils total thickness. Tape shall be

laminated with a suitable adhesive; widths as recommended by the manufacturer for the pipe size. Wrap straight lengths of piping with an approved wrapping machine.

- B. Field Joints: Valves and Fittings: double wrap polyvinyl chloride tape as above. Provide at least two thicknesses of tape over the joint and extend a minimum of 4 inches over adjacent pipe covering. Build up with primer to match adjacent covering thickness. Width of tape of fittings shall not exceed 3 inches. Tape shall adhere tightly to all surfaces of the fittings without air pockets.
- C. Testing: Test completed wrap of piping, including all epoxy painted piping with Tinker and Razor Co. test machine (San Gabriel, CA - 818-287-5259), Pipeline Inspection Company (Houston, TX - 713-681-5837), or equal.
- D. Cleaning: Clean all piping thoroughly before wrapping.
 - 1. Inspection: Damaged or defective wraps shall be repaired as directed. No wrapped pipe shall be covered until approved by Architect.
- E. Sleeve copper piping/tubing installed below slab with "Polywrap-C" polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 6 mils thick, colored blue for domestic water piping and orange for other piping. Install sleeve per manufacturer's recommendations and instructions.
- F. Sleeve copper piping/tubing installed outside building below grade with "Polywrap-C" polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 6 mils thick, colored blue for domestic water piping. Install sleeve per manufacturer's recommendations and instructions.
- G. Sleeve cast iron and ductile iron pipe below grade and below slab with "Polywrap" polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 8 mils thick, colored natural. Install sleeve per manufacturer's recommendations and instructions.
- H. Covering: No rocks or sharp edges shall be backfilled against the wrap or sleeve. When backfilling with other than sand, protect wrap with an outer wrapping of Kraft paper; leave in place during backfill.

3.14 PIPE IDENTIFICATION

- A. Provide temporary identification of each pipe installed, at the time of installation. Temporary identification shall be removed and replaced with permanent identification as part of the work.
- B. Apply the legend and flow arrow at all valve locations; at all points where the piping enters or leaves a wall, partition, cluster of piping or similar obstruction, at each change of direction and at approximately 20'-0" intervals on pipe runs. Variations or changes in locations and spacing may be made with the approval of the Architect. There shall be at least one marking in each room. Markings shall be located for maximum visibility from expected personnel approach.
- C. Wherever two or more pipes run parallel, the markings shall be supplied in the same relative location on each.
- D. Apply markings after painting and cleaning of piping and insulation is completed.

3.15 EXPANSION ANCHORS IN HARDENED CONCRETE

- A. Refer to Structural Drawings.
- B. Qualification Tests: The specific anchor shall have a current ICC-ES report and evaluated in cracked concrete in accordance with Acceptance Criteria AC193. If the specific anchor satisfies cyclic testing requirements per Acceptance Criteria AC01, Section 5.6, the full allowable shear and tension loads listed in the current ICC-ES report and manufacturer's recommendations for the specific anchor may be used. Otherwise, the design shear and tension loads shall not be more than 80% of the listed allowable shear and tension loads for the specific anchor.
- C. Installation: The anchors must be installed in accordance with the requirements given in ICC Research Committee Recommendations for the specific anchor.
- D. Testing: Fifty percent of the anchors shall be load-tested on each job to twice the allowable capacity in tension, except that if the design load is less than 75 pounds; only one anchor in ten need be tested. If any anchor fails, all anchors must be tested. The load test shall be performed in the presence of a special inspector.
- E. The load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, a torque wrench calibrated using the specific anchor or calibrated spring-loading devices. Anchors in which the torque is used to expand the anchor without applying tension to the bolt may not be verified with a torque wrench.

3.16 PIPING SYSTEM PRESSURE TESTING

- A. General:
 - 1. Perform operational tests under simulated or actual service conditions, including one test of complete plumbing installation with fixtures and other appliances connected.
 - 2. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- B. Piping Systems: Test piping systems in accordance with the following requirements and applicable codes:
 - 1. Authority having jurisdiction shall witness tests of piping systems.
 - 2. Notify Architect at least seven days in advance of testing.
 - 3. All piping shall be tested at completion of roughing-in, or at other times as directed by Architect.
 - 4. Furnish necessary materials, test pumps, gases, instruments and labor required for testing.
 - 5. Isolate from system equipment that may be damaged by test pressure.
 - 6. Make connections to existing systems with flanged connection. During testing of new work, provide a slip-in plate to restrict test pressure to new systems. Remove plate and make final connection to existing system at completion of testing.
 - a. Authority having jurisdiction shall witness final connection to system.

- C. Test Schedule: No loss in pressure or visible leaks shall show after four hours at the pressures indicated.
- D. Testing of Sanitary Sewer, Drain, Vent, and Storm Drain may be done in segments in order to limit pressure to within manufacturer’s recommendations. Test to 10 feet above highest point in the system.

<u>System Tested</u>	<u>Test Pressure PSI</u>	<u>Test With</u>
Sanitary Sewer, Drain, Vent	10 Ft. Hd.	Water
Storm Drain, Condensate Drains	10 Ft. Hd.	Water
Domestic Water	125	Water
Natural Gas (PE)	60	Air & Non-corrosive Leak Test Fluid
Natural Gas (Steel)	100	Air & Non-corrosive Leak Test Fluid
Compressed Air	200 lb.	Air & Non-corrosive Leak Test Fluid
Deionized Water	50	Water

- 1. Flush deionized water lines with deionized water after test and approval.
- 2. Non-corrosive leak test fluid shall be suitable for use with piping material specified, and with the type of gas conveyed by the piping system.

3.17 OPERATION OF SYSTEMS

- A. Do not operate any plumbing equipment for any purpose, temporary or permanent, until all of the following has been completed:
 - 1. Complete all requirements listed under “Check, Test and Start Requirements.”
 - 2. Piping has been properly cleaned. Piping systems shall be flushed and treated prior to operation.
 - 3. Filters, strainers etc. are in place.
 - 4. Bearings have been lubricated, and alignment of rotating equipment has been checked.
 - 5. Equipment has been run under observation, and is operating in a satisfactory manner.
- B. Provide test and balance agency with one set of Contract Drawings, Specifications, Addenda, Change orders issued, applicable shop drawings and submittals and temperature control drawings.

3.18 CHECK, TEST AND START REQUIREMENTS

- A. An authorized representative of the equipment manufacturer shall perform check, test and start of each piece of plumbing equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the check test and start of the equipment.
1. As part of the submittal process, provide a copy of each manufacturer's printed startup form to be used.
 2. Some items of specified equipment may require that check, test and start of equipment must be performed by the manufacturer, using manufacturer's employees. See specific equipment Articles in these Specifications for this requirement.
 3. Provide all personnel, test instruments, and equipment to properly perform the check, test and start work.
 4. When work has been completed, provide copies of reports for review, prior to final observation of work.
- B. Provide copies of the completed check, test and start report of each item of equipment, bound with the Operation and Maintenance Manual.
- C. Upon completion of the work, provide a schedule of planned maintenance for each piece of equipment. Indicate frequency of service, recommended spare parts (including filters and lubricants), and methods for adjustment and alignment of all equipment components. Provide a copy of the schedule with each operating and maintenance manual. Provide a copy of certification from the Owner's representative indicating that they have been properly instructed in maintenance requirements for the equipment installed.

3.19 PRELIMINARY OPERATIONAL REQUIREMENTS AND TESTS

- A. Prior to observation to determine final acceptance, put all mechanical systems into service and check that work required for that purpose has been done, including but not limited to the following condensed check list. Provide indexed report to tabulating the results of all work.
1. All equipment has been started, checked, lubricated and adjusted in accordance with the manufacturer's recommendations.
 2. Correct rotation of motors and ratings of overload heaters are verified.
 3. Specified filters are installed and spare filters have been turned over to Owner.
 4. All manufacturers' certificates of start-up specified have been delivered to the Owner.
 5. All equipment has been cleaned, and damaged painted finishes touched up.
 6. Missing or damaged parts have been replaced.
 7. Flushing and chemical treatment of piping systems has been completed and water treatment equipment, where specified, is in operation.
 8. Equipment labels, pipe marker labels, ceiling markers and valve tags are installed.

9. Valve tag schedules, corrected control diagrams, sequence of operation lists and start-stop instructions have been posted.
 10. Preliminary test and balance work is complete, and reports have been forwarded for review.
 11. Automatic control set points are as designated and performance of controls checks out to agree with the sequence of operation.
 12. Operation and Maintenance Manuals have been delivered and instructions to the operating personnel have been made.
- B. Prior to the observation to determine final acceptance, operate all mechanical systems as required to demonstrate that the installation and performance of these systems conform to the requirements of these specifications.
1. Operate and test all mechanical equipment and systems for a period of at least five consecutive 8 hour days to demonstrate the satisfactory overall operation of the project as a complete unit.
 2. Commence tests after preliminary balancing and adjustments to equipment have been checked. Immediately before starting tests, install air filters and lubricate all running equipment. Notify the Architect at least seven calendar days in advance of starting the above tests.
 3. During the test period, make final adjustments and balancing of equipment, systems controls, and circuits so that all are placed in first class operating condition.
 4. Where Utility District rebates are applicable, demonstrate that the systems meet the rebate program requirements.
- C. Review of Contractor's Tests:
1. All tests made by the Contractor or manufacturers' representatives are subject to observation and review by the Owner. Provide timely notice prior to start of each test, in order to allow for observation of testing. Upon the completion of all tests, provide a letter to confirm that all testing has been successful.
- D. Test Logs:
1. Maintain test logs listing the tests on all mechanical systems showing dates, items tested, inspectors' names, remarks on success or failure of the tests.
- E. Preliminary Operation:
1. The Owner reserves the right to operate portions of the plumbing system on a preliminary basis without voiding the guarantee.

3.20 CERTIFICATES OF INSTALLATION

- A. Contractor shall complete applicable "Certificates of Installation" forms contained in the California Building Energy Efficiency Standards and submit to the authorities having jurisdiction for approval and issuance of final occupancy permit, as described in the California Energy Code.

3.21 DEMONSTRATION AND TRAINING

- A. An authorized representative of the equipment manufacturer shall train Owner-designated personnel in maintenance and adjustment of equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the Owner training for the equipment installed.
1. As part of the submittal process, provide a training agenda outlining major topics and time allowed for each topic.
 2. Some items of specified equipment require that training must be performed by the manufacturer, using manufacturer's employees. See specific equipment Articles in these Specifications for this requirement.
 3. Contractor shall provide three copies of certification by Contractor that training has been completed, signed by Owner's representative, for inclusion in Operation and Maintenance Manual. Certificates shall include:
 - a. Listing of Owner-designated personnel completing training, by name and title.
 - b. Name and title of training instructor.
 - c. Date(s) of training.
 - d. List of topics covered in training sessions.
 4. Refer to specific equipment Articles for minimum training period duration for each piece of equipment.

END OF SECTION

SECTION 22 10 00 - PLUMBING PIPING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Valves.
 - 3. Domestic water piping specialties.
 - 4. Drain and waste piping specialties.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.03 ACTION SUBMITTALS

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.
- B. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing piping systems materials and products.

1.04 INFORMATIONAL SUBMITTALS

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.
- B. Gas Pipe Installer Qualifications: Provide evidence of current qualifications for individuals performing work requiring qualifications.

1.05 CLOSEOUT SUBMITTALS

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.
- B. Maintenance Data: Submit maintenance data and parts lists for plumbing piping systems materials and products. Include this data in Operation and Maintenance Manual.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

1.07 QUALITY ASSURANCE

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

PART 2 - PRODUCTS**2.01 MATERIALS AND PRODUCTS**

- A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide materials and products complying with California Plumbing Code. Where more than one type of material or product is indicated, selection from materials or products specified is Contractor's option.
- B. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372. Plastic piping components shall be marked with "NSF-pw."

2.02 PIPE AND FITTINGS ATTACHED TO AND BELOW BUILDINGS INCLUDING 5 FEET FROM BUILDINGS

- A. Piping and fittings attached to covered walkways and corridors shall comply with the requirements of this article.
- B. Drain and Waste Pipe Above Grade: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard (CISPI) 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler Pipe, or equal. Pipe and fittings shall be the products of a single manufacturer. At Contractor's option, vertical piping above floor from lavatories, sinks, and drinking fountains may be Schedule 40 galvanized steel pipe with black cast iron drainage fittings, or DWV weld pipe and fittings.
 - 1. Joints above grade: No-Hub pipe conforming to ASTM A888 and CISPI 301. Couplings conforming to ASTM 1277 and CISPI 310, with stainless steel bands. Provide products by ANACO-Husky, Tyler, Ideal or equal. Provide sway brace at 20'-0" maximum spacing for suspended pipe with No-Hub joints. Provide a brace on each side of a change in direction of 90 degrees or more. Brace riser joints at each floor and at 15 foot maximum intervals (also see Specification Section 22 00 50).
 - a. HCAI Projects: Provide sway brace at each joint per CBC.
- C. Drain and Waste Pipe Below Grade: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and CISPI 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler Pipe, or equal. Pipe and fittings shall be the products of a single manufacturer. At Contractor's option, hub and spigot cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A-74 and so marked, may be used.
 - 1. Joints below grade: ANACO-Husky SD 4000, Clamp-All 125, or equal couplings and No-Hub fittings, meeting the requirements of FM 1680, SD Class I and ASTM C1540.
 - 2. Joints below grade (hub and spigot option): Neoprene gaskets conforming to ASTM C564, as manufactured by Ty-Seal, Dual-Tite, or equal.
- D. Vent Pipe:
 - 1. 3 inch and larger: Cast iron soil pipe and fittings conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Joints in cast iron vent pipe shall be the same as specified for cast iron waste pipe above grade.
 - 2. 2-1/2 inch and smaller: Cast iron soil pipe and fittings as specified for sizes 3 inch and larger, Schedule 40 galvanized steel pipe with black cast iron drainage fittings, or DWV copper pipe and fittings.

3. Vent pipe buried in ground and to 6 inches above ground: Cast iron soil pipe and fittings conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Joints in cast iron vent pipe shall be the same as specified for cast iron waste pipe below ground.
- E. Water Pipe (Tempered Water, Tempered Water Return, Hot Water, Hot Water Return and Cold Water): ASTM B88, Type L copper tubing, hard-temper, with wrought copper fittings. Provide full solder cup for all fittings. Capped or plugged outlets shall be Schedule 40 screwed brass. Water piping below slab: ASTM B88, Type K copper tubing, hard temper, with wrought copper fittings. At Contractor's option, pipe runs below slab having no branches may be ASTM B88, Type K annealed copper tubing without joints. See Section 22 00 50 for pipe protection requirements for below slab copper piping.
- F. Temperature and Pressure Relief Valve Piping: ASTM B88, Type L copper tubing, hard-temper, with wrought copper fittings. Provide full solder cup for all fittings. Capped or plugged outlets shall be Schedule 40 screwed brass.

2.03 SITE PIPING AND FITTINGS TO 5 FEET FROM BUILDINGS

- A. Buried Drain, Waste, and Vent Piping:
 1. Install piping from street connection to the property line in accordance with local requirements.
 2. 4 inches and larger: PVC, ASTM D3034 - SDR 35; use matching Ring Tite fittings.
 3. 3 inches and smaller: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler pipe, or equal. Provide ANACO-Husky SD 4000, Clamp-All 125, or equal couplings and No-Hub fittings, meeting the requirements of FM 1680, SD Class I and ASTM C1540. Pipe and fittings shall be the product of a single manufacturer.
- B. Water Service Piping:
 1. Sizes 2 inches and larger (not under building): Gasket style PVC conforming to ASTM D2241-SDR21, Class 200 with gasket type fittings or ductile iron mechanical joint couplings. Gasket fittings shall be one piece injection molded PVC fittings, equal to Flo-Seal water main fittings for PVC pressure pipe, 200 psi, ASTM D-3139.
 2. Sizes less than 2 inches: Type K copper tubing, hard temper, with wrought copper fittings. See Section 22 00 50 for pipe protection requirements for below grade copper piping.
 3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. J.M. Eagle.
 - b. P.W. Pipe.
 - c. Ipex Series Pipe.
- C. Water Service Piping Above Grade:

1. Sizes 3 inches and larger: Class 150 flanged ductile cast iron water pipe conforming to AWWA/ANSI C150/A21.50 and manufactured in accordance with AWWA/ANSI C151/A21.51. Fittings shall conform to AWWA/ANSI C110/A21.10, Class 250 pattern. Pipe and fittings shall have factory applied cement-mortar lining in accordance with AWWA/ANSI C104/A21.4. Flanges shall conform to ASME/ANSI B16.1.
2. Piping 2-1/2 inches and smaller: Type K copper tubing, hard temper, with brazed wrought copper fittings.

2.04 PIPE JOINING MATERIALS

- A. Refer to piping Articles in this Section for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated
 - a. Full-Face Type: For flat-face, Class 125, cast iron and cast bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast iron and steel flanges.
 2. AWWA C111, rubber, flat face, 1/8-inch (3.2mm) thick, unless otherwise indicated; and full-face or ring type, unless other indicated.
 3. Flange Bolts and Nuts: AWWA C111, carbon steel, unless otherwise indicated.
 4. Plastic, Pipe-Flange Gasket, Bolts and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, 100 percent lead free alloys. Include water-flushable flux according to ASTM B813.
- D. Brazing Filler Metals: AWS A5.8, BCup-5 Series, copper-phosphorus unless otherwise indicated. Sil-Fos 15, or equal.
- E. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 1. PVC solvent cement shall have VOC content of 510 g/L or less.
 2. Adhesive primer shall have VOC content of 550 g/L or less.
 3. Solvent cement and adhesive primer shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.

2.05 VALVES AND FITTINGS FOR POTABLE WATER SYSTEMS

- A. General:
 1. Provide valves and fittings conforming to lead-free requirements of California Health and Safety Code Section 11 68 75.
 - a. Provide valves listed to NSF/ANSI 61-G or NSF/ANSI 372 for valve materials for potable-water service.

- 1) Exception: Main distribution gate valves above 1-1/2 inches located underground outside building are not required to conform lead-free requirements of California Health and Safety Code Section 11 68 75.

B. Gate Valves:

1. General: Furnish valves in copper lines with adapters to suit valve/line requirements.
2. 1-1/2 inches and smaller: Minimum 200 psi CWP, bronze body, threaded bonnet, rising or non-rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Milwaukee UP148, UP149, Nibco T-113-LF, S-113-LF, or equal.
3. 2 inches through 3 inches: Minimum 200 psi CWP, bronze body, threaded bonnet, non-rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Nibco T-113-LF, S-113-LF, or equal.
4. Main distribution gate valves underground outside building above 1-1/2 inches:
 - a. Underground valves 2 inches thru 12 inches: 250 psi, iron body, Non-rising stem, bolted bonnet, resilient wedge valves, conforming to AWWA C509, equipped with operating nuts, Mueller Series 2360, Nibco F-619-RW-SON, or equal.
 - 1) Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.
 - 2) Furnish and deliver to Owner one wrench of each size required for operating underground valves.

C. Ball Valves:

1. 2 inches and smaller: 600 psi CWP, cast bronze or brass body, full port, two piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco T-685-80-LF, Milwaukee UPBA400, Apollo 77C-LF10, Kitz 868, or equal.
2. 2-1/2 inches: Apollo 77C-LF10, or equal.

D. Swing Check Valves:

1. Minimum 200 psi CWP, bronze or brass body, suitable for regrinding, threaded ends, conforming to MSS SP-80. Milwaukee UP509, Nibco T-413LF, Kitz 822T, or equal.

E. Butterfly Valves:

1. General: Tight closing, full lug type, with resilient seat suitable for minimum working pressure of 200 psig, conforming to MSS SP-67. Bi-direction dead end service with downstream flange removed.
2. Provide valves with the following:
 - a. Seats: suitable for 40 degrees F for cold water service and 250 degrees F for hot water service. Seats shall cover inside surface of body and extend over body ends.
 - b. Bodies: ductile iron or cast iron.
 - c. Discs: Bronze or stainless steel.

- d. Stems or Shafts: Stainless steel. Install valves with stems horizontal.
 - e. Control Handles: Suitable for locking in any position or with 10 degree or 15 degree notched throttling plates to hold valve in selected position. Provide extended necks to compensate for insulation thickness. Provide gear operator for valves 5 inches and larger.
3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
- a. 2 through 12 inches: Watts Regulator Co., model DBF-03.
- F. Silent Check Valves (for use on pump discharge):
1. General: Provide spring loaded check valves at pump discharge of all pumps.
 - a. 2 inches and smaller: Minimum 300 psi CWP, bronze body, Apollo 61LF, Milwaukee UP548-T, or equal.
 - b. 2-1/2 inches and larger: Class 250, cast iron body, suitable for regrinding, Mueller 103MAP, or equal.
- G. Calibrated Balancing Valves:
1. General: Calibrated orifice ball type rated for 400 psig maximum operating pressure and 250 degrees F. maximum operating temperature.
 - a. Body: Brass.
 - b. Ball: 304 Stainless Steel.
 - c. Seat: Glass and Carbon filled TFE.
 - d. End Connections: Threaded.
 - e. Pressure Gage connections: Integral capped readout valves with internal check valves and drain port, for use with portable pressure differential meter.
 - f. Handle Style: Dial, with memory stops to retain set position.
 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. 3 Inch and Smaller: Bell & Gossett model CB, "LF" series.

2.06 VALVES AND FITTINGS FOR NON-POTABLE WATER, COMPRESSED AIR, AND GAS SYSTEMS

- A. Gate Valves:
1. 2-1/2 inches and smaller: Class150, bronze body, union bonnet, rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Hammond IB641, IB648, Nibco T-134, S-134, Milwaukee 1151, 1169, or equal.

2. 3 inches and larger: Class 125, iron body, bronze mounted, bolted bonnet, non-rising stem, solid wedge, flanged ends, conforming to MSS SP-70. Hammond IR-1138, Nibco F619, Milwaukee F2882A, Stockham G-612, or equal.
 3. Underground valves 2 inches thru 12 inches: 250 psi, iron body, Non-rising stem, bolted bonnet, resilient wedge valves, conforming to AWWA C509, equipped with operating nuts, Mueller Series 2360, Nibco F-619-RW-SON, or equal.
 - a. Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.
 - b. Furnish and deliver to Owner one wrench of each size required for operating underground valves.
- B. Ball Valves:
1. 2 inches and smaller: 600 psi CWP, 150 psi SWP, cast bronze body, full port, two piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco T585-70, Milwaukee BA-400, Stockham T-285, or equal.
 2. 2-1/2 inches and larger: Class 150, carbon steel body, full port, two piece, stainless steel vented ball, flanged ends, and reinforced PTFE seal, conforming to MSS SP-72. Nibco F-515-CS-F-66-FS, Milwaukee F20-CS-15-F-02-GO-VB, or equal.
 3. Compressed Air Services: 600 psi CWP, 150 psi SWP, bronze body, full port, three piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco Model T-595-Y, Milwaukee BA-300, or equal.
- C. Swing Check Valves: Class 125 or 150, bronze body, suitable for regrinding, threaded ends, conforming to MSS SP-80. Stockham B-321, Milwaukee 509, Nibco T-433, or equal.
- D. Butterfly Valves:
1. General: Tight closing, full lug type, with resilient seat suitable for minimum working pressure of 200 psig, conforming to MSS SP-67. Bi-direction dead end service with downstream flange removed.
 2. Provide valves with the following:
 - a. Seats: Suitable for 40 degrees F for cold water service and 250 degrees F for hot water service. Seats shall cover inside surface of body and extend over body ends.
 - b. Bodies: Ductile iron or cast iron.
 - c. Discs: Bronze or stainless steel.
 - d. Stems or Shafts: Stainless steel.
 - e. Control Handles: Suitable for locking in any position or with 10 degree or 15 degree notched throttling plates to hold valve in selected position. Provide extended necks to compensate for insulation thickness. Provide gear operator for valves 5 inches and larger.
 3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

- a. 2 through 12 inches: Milwaukee Valve, CL series, Nibco, Inc., Model LD2000-3, or equal.
- E. Silent Check Valves (for use on pump discharge):
1. General: Provide spring loaded check valves at pump discharge of all pumps.
 2. 2 inches and smaller: 250 psi CWP, bronze body, Nibco Model T-480, Milwaukee 548-T, or equal.
 3. 2-1/2 inches and larger: Class 250, cast iron body, wafer style, suitable for regrinding. Nibco Model F960, Milwaukee 1400, Mueller 103MAP, or equal.
- F. Calibrated Balance Valves (Symbol CBV): Provide globe style valves for precision regulation and control rated 175 psi for sizes 2-1/2 inches through 12 inches and rated 240 psi for bronze sizes 2 inches and below. Each valve shall have two metering/test ports with internal check valves and protective caps. All valves must be equipped with visual position readout and concealed memory stops for repeatable regulation and control.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Bell & Gossett Circuit Setter Plus.
 - b. Armstrong CBV.
 - c. Flow Design Inc. Accusetter.
 - d. Tour & Andersson.
 - e. Circuit Sensor with butterfly valve above 3 inches.
 - f. Illinois Series 5000 through 2 inches.
- G. Flow Control Valves: Automatic pressure compensating flow control valves shall be Griswold, Flow Design, Inc., or equal.

2.07 DOMESTIC WATER PIPING SPECIALTIES

- A. Hose Bibbs:
1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
 - a. Acorn Engineering Co.
 - b. Woodford Manufacturing Co.
 2. Hose Station: Leonard THS-25-VB-CW, Symmons, or equal.
- B. Wall Hydrants:
1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

- a. Acorn Engineering Co.
- b. Woodford Manufacturing Co.
- c. Mifab, Inc.

C. Water Hammer Arrestors:

1. Provide water hammer arrestors conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, with nesting type bellows contained within a casing having sufficient displacement volume to dissipate the calculated kinetic energy generated in the piping system. Water hammer arrestors shall be sized for type and number of fixtures served. Provide all stainless steel shell construction with stainless steel bellows and threaded connection to water system.
2. Water hammer arrestors shall be certified under P.D.I. Standard WH201 and by ASSE Standard 1010.
3. Select units in accordance with the requirements of Plumbing and Drainage Institute Standard P.D.I. WH201. Install above ceilings or behind wall access door at each plumbing fixture, or where plumbing fixtures are installed in groups, at each group of fixtures.
4. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Josam Company, series 75000.
 - b. Smith (Jay R.) Mfg. Co., Hydrotrol 5005-5050.
 - c. Mifab, series WHB.

D. Water Filters:

1. Provide Cuno Incorporated, Aqua Pure model AP510, or equal, point of use water filters, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, in locations indicated on Drawings.
 - a. Provide model AP517 filter cartridge at each location, with 5 micron rating and 2,000 gallon rating, to remove sediment, rust, scale and chlorine taste and odor from incoming water. 2 gallon per minute capacity.
 - b. Provide one spare cartridge for each unit provided.

E. Reduced Pressure Backflow Preventers for Potable Water Systems:

1. Provide reduced pressure principle backflow preventer conforming to lead free requirements of California Health and Safety Code Section 11 68 75.
 - a. Reduced-pressure principle backflow preventer assembly, consisting of shutoff valves on inlet and outlet, and strainer on inlet., Backflow preventer shall include test cocks, and pressure differential relief valve located between two positive seating check valves. Construct in accordance with ASSE Standard 1013.

- b. Manufacturers: Subject to compliance with requirements and local water authorities having jurisdiction, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - 1) 2 inches and smaller: Wilkins 975XL2, Febco LF825YRP, Watts LF919.
 - 2) 2-1/2 thru 10 inches: Wilkins 475AXL, Febco LF860RP.
 - 3) 2-1/2 and 3 inches: Watts LF009.
 2. Provide LeMeur, Hot-Box, WattsBox, or equal, two piece reinforced aluminum, fiberglass, welded angle with expanded metal, backflow preventer enclosure, sized to suit the size of backflow preventer. Install on concrete pad, in accordance with manufacturer's written installation instructions.
 3. Provide substantial padlock and chain to lock valves in open position, and turn key over to Project Inspector.
 - a. Padlocks shall be as specified under Section 08 70 00.
 - b. Chain shall be of carbon steel, 3/8 inch wire diameter, fully welded links and weight of 140 pounds per 100 lineal feet. Chain shall be hot galvanized.
 4. Provide capped connections at each test cock. Install in accordance with requirements of Authority Having Jurisdiction.
- F. Potable Water Pressure-Regulating Valve:
1. Provide pressure-regulating valves, single-seated, direct-operated type, bronze body, integral strainer, complying with requirements of ASSE Standard 1003, and the lead-free requirements of California Health and Safety Code Section 11 68 75. Size for maximum flow rate and inlet and outlet pressure indicated on Drawings.
 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Cla-Val Company.
 - b. Watts Regulator Company.
- G. Thermostatic Water Temperature Control Valve:
1. Provide thermostatic water temperature control valve conforming to lead free requirements of California Health and Safety Code Section 11 68 75, with size as noted on Drawings, complete with union angle strainer checkstops. Valves shall be thermostatic type, with a maximum temperature setting as follows:
 - a.
 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Leonard Valve Company.
 - b. Lawler Manufacturing Co., Inc.

c. Powers.

H. Relief Valves:

1. Provide relief valves as indicated, of size and capacity as selected by Contractor for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code.
2. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI A21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 degrees F, and pressure relief at 150 psi.
3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Watts Regulator Company.
 - b. Cash (A.W.) Valve Manufacturing Corporation.
 - c. Zurn Industries, Inc.; Wilkins-Regulator Division.

I. Trap Primers:

1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
 - a. MiFab, Inc.
 - b. Precision Plumbing Products.
 - c. Sioux Chief Manufacturing Company.

2.08 DRAIN AND WASTE PIPING SPECIALTIES

A. Cleanouts:

1. General: Install cleanouts of same diameter as pipe (4 inch maximum) in all horizontal soil and waste lines where indicated and at all points of change in direction. Cleanouts shall be located not less than 18 inches from building construction so as to provide sufficient space for rodding. No horizontal run over 50 feet inside buildings or 100 feet outside buildings shall be without cleanout, whether shown on Drawings or not. Provide two-way cleanouts where indicated on drawings, and where required for satisfactory use.
 - a. Provide cleanouts in waste drop from each sink and urinal.
 - b. Provide one wrench for each size and type of cleanout used. Turn over to Owner at completion of the project, and obtain receipt. Place receipt in Operation and Maintenance Manuals.
2. Cleanouts in floor and in concrete sidewalks: Ducco Cast Iron with nickel bronze top, clamping collar and ABS plastic plug: Zurn ZN-1400-KC, or equal, with square or round top to suit floor construction.
3. Cleanouts in composition floors: Zurn ZN-1400-X-DX, or equal (nickel bronze top).

4. Cleanouts in concealed, aboveground cast-iron soil or waste lines: Zurn Z-1440A, or equal, with ABS plastic plug.
 5. Cleanouts in walls: Zurn Z-1441 or Z-1443, or equal, with stainless steel cover. Provide long sweep elbow or combination wye at connection to riser and install with surface of cleanout within ½ inch of front face of finished wall.
 - a. Where space does not permit the above installation, provide Zurn Z-1446, or equal, with stainless steel access cover, and vandal resistant screw.
 - b. Install face of cleanout plug within 1/2 inch of front face of finished wall.
- B. Floor Drains:
1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
 - a. J.R. Smith.
 - b. MIFAB.
 - c. Watts.
 - d. Zurn.
- C. Floor Sinks:
1. Floor Sinks: Provide anchoring flange (seepage pan) at all floor sinks, and provide flashing clamp in locations where floor membrane is used. Provide cast iron "P" trap and trap primer connection at P-Trap.
 2. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
 - a. J.R. Smith.
 - b. MIFAB.
 - c. Watts.
 - d. Zurn.
- D. Area Drain:
1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
 - a. Brooks.
 - b. J.R. Smith.
 - c. Old Castle Precast.
 - d. Watts.

e. Zurn.

E. Backwater Valves:

1. Provide Zurn Model Z-1090 J. R. Smith 7012, or equal flapper type backwater valve where indicated on drawings. Install in accordance with manufacturer's recommendations.
2. Provide Christy Model B16, Brooks, or equal utility box, 12 inches by 22 inches size, for installation of backwater valve.
3. Provide Zurn Model Z-1091, J.R. Smith 7070, or equal terminal type backwater valve, and install in catch basin piping at the outlet of the catch basin.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which plumbing piping systems are to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to Contractor.
- B. Make all arrangements for the utilities required. Pay all costs involved in obtaining the services including gas service and meter, water meter, pressure reducing valve, access boxes, street work. Connect to site utilities. Verify the location of all services. No extra cost will be allowed if services are not as shown.
- C. Determine sanitary sewer and storm drain location and elevation at all points of connection before installing any piping. Notify Architect immediately if indicated grades cannot be maintained.
- D. At time of final connection, and prior to opening valve to allow pressurization of water and gas piping from existing systems, on site or off site, perform a pressure test to indicate static pressure of existing systems. If pressure on water piping is greater than 80 psi, or gas pressure is not as indicated on Contract Documents, inform Architect immediately. Do not allow piping systems to be pressurized without written consent of the Architect.

3.02 INSTALLATION OF WATER PIPING

- A. Run all water piping generally level, free of traps or unnecessary bends, arranged to conform to the building requirements, and to suit clearance for other mechanical work such as ducts, flues, conduits, and other work. No piping shall be installed so as to cause unusual noise from the flow of water therein under normal conditions.
- B. Provide manufactured water hammer arrestors, sized and installed in accordance with Plumbing and Drainage Institute Standard PDI WH201.
 1. Locate water hammer arrestors at every plumbing fixture, or, where fixtures are located in groups, at every group of fixtures, and as indicated on Drawings.
 2. Install water hammer arrestors above accessible ceilings, or install access doors for service.
- C. Install piping on room side of building insulation.

- D. Check final location of rubber rings within couplings on PVC water piping with gauge or as recommended by manufacturer. Make connection to valves with cast iron adapters connected to water pipe with cast iron couplings. Furnish and install anchors or thrust blocks.
- E. For all faucets, hose bibbs, or other water outlets delivering industrial hot and/or cold water, provide a sign, permanently mounted, indicating "CAUTION: NON-POTABLE WATER, DO NOT DRINK". Each sign shall be permanently engraved with black uppercase letters on a yellow background. Letters shall be minimum 1-1/4 inch high.

3.03 INSTALLATION OF SANITARY AND STORM DRAINAGE SYSTEMS

- A. Make joints in PVC sewer pipe with PVC-type couplings and rubber rings.
- B. Check final location of rubber rings within the couplings with gauge or as recommended by the manufacturer. Make joints between PVC pipe and cast iron pipe or fittings using cast iron adapter fittings, installed as recommended by the manufacturer.
 - 1. Ring-Tite cast iron pipe fittings may be used in lieu of standard fittings. Make connection to valves with cast iron adapters connected to the pipe with PVC couplings.
- C. Sewer Piping: Run all horizontal sanitary drain piping inside of building on a uniform grade of not less than 1/4 inch per foot unless otherwise noted or later approved. Unless otherwise noted on the plans, piping shall have invert elevations as shown and slope uniformly between given elevations.
- D. Run all drainage piping as straight as possible and provide easy bends with long turns; make all offsets at an angle of 45 degrees or less.
- E. Grade all vent piping so as to free itself quickly of any water condensation.
- F. Where possible, join groups of vent risers together with one enlarged outlet through roof. Maintain minimum of 10 foot horizontal or 3 foot vertical clearance from air intakes.
- G. Hubless Cast Iron Joints: Comply with coupling manufacturer's installation instructions.

3.04 PIPE JOINTS AND CONNECTIONS

- A. General:
 - 1. Cutting: Cut pipe and tubing square, remove rough edges or burrs. Bevel plain ends of steel pipe.
 - 2. Remove scale, slag, dirt and debris from inside and outside of pipe before assembly.
 - 3. Boss or saddle type fittings or mechanically extracted tube joints will not be allowed.
- B. Threaded Pipe: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply thread compound to external pipe threads: Rectorseal No. 5, Permatex No. 1, or equal.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

- C. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- D. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings according to the following:
1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
 2. PVC Piping: Join according to ASTM D 2855.
- E. Copper Pipe and Tubing (Except pneumatic control piping): All joints shall be brazed according to ASME Section IX, Welding and Brazing Qualifications, except domestic water piping 1-1/4 inches and smaller when not buried in the ground or concrete and type DWV plumbing piping may be soldered.
1. Soldered joints: Apply water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828.
- F. Cast Iron Soil Pipe:
1. No-Hub fittings shall be made with a torque wrench.
 2. Hub joints shall be with Ty-Seal couplings.
 3. Wrought iron, steel, or copper pipe shall have a ring or part of a coupling screwed on to form a spigot end if caulked into a joint.
 4. Connect cast iron sewer piping to outside service pipe with cast iron or vitrified LOP reducers or increasers as required. Caulking of smaller pipe into the larger without a reducer or increaser will not be permitted.
- G. PVC Sewer and Drainage Pipe (outside building as allowed only): Four inches and larger shall be bell and spigot, assembled in accordance with manufacturer's recommendations. Joint shall be tested in accordance with ASTM D3212. Solvent weld joints below 4 inches in size, schedule 40 PVC with matching fittings, assembled per manufacturer's instructions.
- H. Make joints in PVC water pipe with PVC couplings and rubber rings, Manville Ring-Tite, PW Pipe, or equal. Check final location of rubber rings with the couplings with gauge or as recommended by the manufacturer. Make joints between PVC pipe and cast iron pipe or fittings using cast iron or PVC adapter fittings, installed as recommended by the manufacturer. Ring-Tite PVC or cast iron pipe fittings may be used in lieu of standard fittings. Make connection to valves with cast iron adapters connected to the water pipe with PVC couplings.
- I. Flexible Connections:
1. Furnish and install Thermo Tech., Inc. F/J/R, Metraflex, or equal, flexible couplings with limiter bolts on piping connections to all equipment mounted on anti-vibration bases, on each connection to each base mounted pump and where shown. Couplings shall be suitable for pressure and type of service.
 2. Anchor piping securely on the system side of each flexible connection.

3.05 INSTALLATION OF VALVES

- A. Install valves as indicated on Drawings and in the following locations:
1. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
 2. Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere indicated or required to completely drain potable water system.
 3. Provide gate or globe valves on inlet and outlet of each water heater or pump.
- B. General:
1. Valves shall be full line size unless indicated otherwise on Drawings.
 2. Install horizontal valves with valve stem above horizontal, except butterfly valves.
 3. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
 4. Locate valves for easy access and provide separate support where necessary.
 5. Install valves in position to allow full stem movement.
 6. Install exposed polished or enameled connections with special care showing no tool marks or exposed threads.
 7. Butterfly valves conforming to the paragraph "Butterfly Valves" may be used in lieu of gate or globe valves for locations above grade.
 8. Ball valves conforming to the paragraph "Ball Valves" may be used in lieu of gate valves for locations above grade for services 2-1/2 inches and smaller.
 9. Valves 2-1/2 inches and smaller (except ball valves) in nonferrous water piping systems may be solder joint type with bronze body and trim.
 10. Rigidly fasten hose bibbs, hydrants, fixture stops, compressed air outlets, and similar items to the building construction.
- C. Gate Valves:
1. Furnish valves in copper lines with adapters to suit valve / line requirements.
 2. Underground gate valves:
 - a. Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.
 - b. Furnish and deliver to Owner one wrench of each size required for operating underground valves.
- D. Swing Check Valves: Install in horizontal position with hinge pin level.
- E. Butterfly Valves: Install with stems horizontal.

- F. Silent Check Valves: Install in horizontal or vertical position between flanges.
- G. Calibrated Balancing Valves: Install calibrated balancing valves per manufacturers' recommendations, including requirements for straight pipe lengths at valve inlet and outlet.
- H. Valve Adjustment: Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.06 INSTALLATION OF CLEANOUTS

- A. Cleanouts: Install in piping as indicated, as required by California Plumbing Code, at each change in direction of piping greater than 45 degrees. Install at maximum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping inside buildings, and at base of each conductor.
- B. Flashing Flanges: Install flashing flange and clamping device with each cleanout passing through water resistant membrane.

3.07 INSTALLATION OF FLOOR DRAINS AND FLOOR SINKS

- A. Install drains in accordance with manufacturer's written instructions and in locations indicated. Install floor drains with lip of drain slightly below finished floor to ensure drainage. Install floor sinks flush with finished floor. Coordinate with other trades to ensure that floor slopes to drain. Provide flashing flange and clamping device with each drain passing through water resistant membrane.
- B. Install vented P-trap below each drain. Where trap primers are indicated, install trap primer connection in the P-trap.

3.08 TRAP PRIMER INSTALLATION

- A. Install as indicated in manufacturers printed literature, with 1/2 inch, Type L, hard copper piping to trap primer connection on floor drains and floor sinks where indicated on Drawings. At Contractor's option, Type K annealed copper tubing without joints may be used below slab only. See Section 22 00 50 for pipe protection requirements for below slab copper piping/tubing.
- B. Install trap primer piping with 1/4 inch per foot slope, to insure that the line will drain fully to the floor drain or floor sink.
 - 1. Provide ball valve to the inlet at each trap primer location.
- C. Install trap primer and distribution unit exactly as called for in manufacturers printed installation instructions. Connect to domestic water piping from the top of the water line, in order to prevent foreign material from entering directly into primer assembly.
- D. Mount trap primer in wall, in sheet metal box, with Karp or equal access door. Size access door and box to suit valve operation, and solder all seams of box. Seal all penetrations to box with non-hardening waterproof sealant. Provide locking door where installed in occupied spaces.
- E. Where one trap primer will be used for more than one trap, provide a distribution unit with feeder piping for a maximum of four traps sized for equal pressure drop to each trap.

3.09 EQUIPMENT CONNECTIONS

- A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated.
- B. Mechanical Equipment Connections: Connect hot and cold water piping system and gas piping system to mechanical equipment as indicated, and provide with shutoff valve and union for each connection.

3.10 DOMESTIC WATER SYSTEM STERILIZATION

- A. Clean and disinfect new or altered hot and cold water piping connected to domestic water systems using methods prescribed by the Health Authority. If the Health Authority does not prescribe methods, clean and disinfect new or altered hot and cold water piping using methods given in the California Plumbing Code.
 - 1. A water treatment company that has a current state EPA license to apply disinfectant chlorine in potable water shall perform the procedure.

3.11 CARE AND CLEANING

- A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Remove labels from stainless steel sinks, except 316 stainless steel sink labels should be retained to confirm that the correct material has been provided. Leave systems and equipment in satisfactory operating condition.

3.12 OPERATIONAL TESTS

- A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.13 TESTING AND BALANCING

- A. See Section 23 05 93 of Specifications for testing and balancing requirements.

3.14 CLEANING UP

- A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES**PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
 - 1. Water supplies and stops.
 - 2. Plumbing fixture hangers and supports.
 - 3. Refrigerator ice maker outlet boxes.
 - 4. Dishwasher air gap fittings.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.03 ACTION SUBMITTALS

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.
- B. Product Data: Submit manufacturer's specifications for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished.

1.04 INFORMATIONAL SUBMITTALS

- A. Refer to Section 22 00 50, Basic Plumbing Materials and Methods.

1.05 CLOSEOUT SUBMITTALS

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.
- B. Maintenance Data: Submit maintenance data and parts lists for each fixture type and trim item, including instructions for care of finishes. Include this data in Operation and Maintenance Manual.

1.06 QUALITY ASSURANCE

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.
- B. Plumbing Fixture Standards: Comply with applicable portions of the following codes and requirements for all work in this Section:
 - 1. California Building Code – CBC
 - 2. California Plumbing Code – CPC
 - 3. California Health and Safety Code

4. American National Standards Institute - ANSI
 5. Federal Standards - F.S.
 6. National Sanitary Foundation – NSF International
- C. ANSI Standards: Comply with ANSI/NSF 61, “Drinking Water System Components – Health Effects.”
- D. PDI Compliance: Comply with standards established by Plumbing and Drainage Institute pertaining to plumbing fixture supports.
- E. Americans with Disabilities Act (ADA).
- F. California Green Building Standards Code Requirements:
1. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.

PART 2 - PRODUCTS

2.01 PLUMBING FIXTURES

- A. General: Provide factory fabricated fixtures of type, style and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete, installation. Where more than one type is dedicated, selection is Contractor's option; but, all fixtures of same type must be furnished by single manufacturer.
1. Take special care with the roughing-in and finished plumbing where batteries of fixtures occur.
 2. Take location and mounting heights for roughing-in from Architectural Drawings.
 3. Follow schedule on Plumbing Drawings for roughing-in connections. Set roughing-in for all fixtures exactly as per measurements furnished by the manufacturers of the fixtures used.
 4. Roughing-in for lavatories and sinks shall be brought in through the wall under the centerline of the drain from the fixture wherever possible and as close to the fixture as possible.

2.02 MATERIALS

- A. Provide materials that have been selected for their surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, foundry sand holes, stains, discoloration, or other surface imperfections on finished units are not acceptable.
- B. Where fittings, trim and accessories are exposed or semi-exposed, provide, chromium plated 17 gauge seamless brass and match faucets and fittings. Provide 17 gauge seamless copper or brass where not exposed.
- C. Handles on all faucets and stops shall be all metal chromium plated.

- D. NSF Standard: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.

2.03 PLUMBING FITTINGS, TRIM AND ACCESSORIES

- A. Water Outlets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valves, or dispensing devices, of type and size indicated, and as required to operate as indicated.
1. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shut-down of water supply piping systems.
- B. P-Traps: Include IAPMO approved removable P-traps where drains are indicated for direct connection to drainage system. P-Traps shall be less trap screw cleanout, and incorporate a chrome plated cast brass body, brass connection nuts, 17 gauge seamless brass wall return and chrome plated wall escutcheon to match trap finish.
- C. Carriers: Provide cast iron supports for fixtures of graphitic gray iron, ductile iron, or malleable iron as indicated. Where the carrier for wall mounted water closets are installed more than 6 inches behind the finished wall, provide water closet support for wide pipe chase.
- D. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.
- E. Escutcheons: Where fixture supplies and drains penetrate walls in exposed location, provide chrome-plated cast brass escutcheons with setscrews.
- F. Aerators: Provide aerators of types approved by Health Departments having jurisdiction. Delete aerators where not allowed by CPC for health care occupancies.
- G. Comply with additional fixture requirements contained in Fixture Schedule shown on the drawings.

2.04 MANUFACTURERS

- A. In accordance with California Plumbing Code, provide indelibly marked or embossed manufacturers name or logo, arranged so as to be visible after installation.
- B. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:
1. Vitrified China Plumbing Fixtures:
 - a. American Standard, U.S. Plumbing Products.
 - b. Eljer Plumbingware Div., Wallace-Murray Corp.
 - c. Kohler Co.
 - d. VitrA.
 2. Modular Lavatories:
 - a. Bradley.

- b. Acorn.
- c. Willoughby Industries, Inc.
- 3. Plumbing Trim:
 - a. McGuire Manufacturing Co., Inc.
 - b. Delta Commercial.
 - c. Chicago Faucet Co.
 - d. T&S Brass and Bronze Works, Inc.
- 4. Flush Valves:
 - a. Sloan Valve Co.
 - b. Zurn Industries, Hydromechanics Div.
 - c. Toto USA, Inc.
- 5. Faucets:
 - a. Chicago Faucet Co.
 - b. Symmons Scott.
 - c. T&S Brass and Bronze Works, Inc.
 - d. Delta Commercial.
- 6. Fixture Seats:
 - a. Church Seat Co.
 - b. Bemis Mfg. Co.
 - c. Beneke Corp.
- 7. Water Coolers and Drinking Fountains:
 - a. Haws Corporation.
 - b. Halsey Taylor Mfg. Co.
 - c. Elkay Mfg. Co.
 - d. Acorn Aqua.
- 8. Service Sinks:
 - a. American Standard.
 - b. Kohler Co.
 - c. Williams Serviceceptor.

- d. Florestone.
- e. Acorn.
- 9. Stainless Steel Sinks:
 - a. Elkay Mfg. Co.
 - b. Just Mfg. Co.
 - c. Haws Corporation.
- 10. Fixture Carriers:
 - a. Josam Mfg. Co.
 - b. J. R. Smith.
 - c. Tyler Pipe; Wade Div.
 - d. Zurn Industries; Hydromechanics Div.
 - e. Mifab, Inc.

2.05 FLUSH VALVE REQUIREMENTS

- A. Metering flush valves where required and specified shall be non-hold open type with exposed parts chrome plated. Conform to all codes and manufacturers' recommendations. All diaphragms are to have multiple filtered bypass and be chloramine resistant synthetic rubber with internal components suitable for 180 degree hot water to 150 pounds pressure, plastic or leather diaphragm not acceptable.

2.06 FIXTURE CONNECTIONS

- A. Make connection between fixtures and flanges on soil pipe absolutely gastight and watertight with neoprene type gaskets (wall hung fixtures) or bowl wax (floor outlet fixtures). Rubber gaskets or putty will not be permitted.
- B. Provide fixtures not having integral traps with P-traps of chromium-plated 17 gauge cast brass, with 17 gauge seamless brass wall return, connected to concealed waste in wall and sanitary fittings. Provide IAPMO approval for trap, and provide less trap screw cleanout.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Dearborn Brass, Commercial series with brass nuts.
 - b. Delta Commercial.
 - c. McGuire Manufacturing Co., Inc.
- C. Connections from stacks or horizontal wastes to wall or floor finish for wastes from lavatories, urinals, sinks, and drinking fountains and connection between floor drains and traps shall be IPS 85 percent red brass pipe.
- D. Plumbing fixture traps connected to special waste systems shall be constructed of materials to suit the waste system.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Orion.
 - b. Enfield
- E. Unions on waste pipes on fixture side of traps may be slip or flange joints with soft rubber or lead gaskets. Traps shall rough in full size to waste and vent connection, using deep escutcheon plate to cover wall penetration. Compression adaptor extensions or sweat adaptors are not acceptable.

2.07 WATER SUPPLIES AND STOPS

- A. Provide 85 percent IPS threaded red brass nipple, conforming to the lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have stop valves installed on water supply lines.
- B. Provide water supplies to fixtures with compression shut-off stops with threaded inlets and lock shield-loose key handles. Provide combination fixtures with compression stop and threaded inlet on each water supply fitting. Provide lock shield-loose key handle for each stop.
- C. Provide 1/2 inch riser tubes with reducing coupling for fixtures, unless otherwise noted.
- D. Provide cast brass escutcheon.
- E. Furnish shut-off valves on hose bibbs where directly connected to mains with no intervening valves.
- F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 1. McGuire Manufacturing Company, Inc., model LFH2167LK.
 2. T & S Brass and Bronze Works, Inc., model B-1305.

2.08 PLUMBING FIXTURE HANGERS AND SUPPORTS

- A. Floor-affixed supports for off-the-floor plumbing fixtures shall comply with ASME A112.6.1M.
- B. Residential type fixture supports are not acceptable.
- C. Install wall mounted water closets with combination support and waste fittings, with feet of support securely anchored to floor.
- D. Install floor mounted water closets with J.R. Smith, Zurn, or equal government pattern cast iron closet flanges with brass bolts, nuts, washers, and porcelain caps secured with Spackle.
- E. Install the following fixtures on concealed support with feet of support securely anchored to floor. Anchor top of support to wall construction in an approved manner.
 1. Wall hung lavatories.
 2. Wall mounted urinals.

3. Drinking fountains.
4. Electric water coolers.

2.09 PLUMBING FIXTURES

- A. Install all plumbing fixtures at height indicated on Architectural Drawings. Where mounting height is not indicated, install at height required by Code.
- B. Special Requirements For Accessible Fixtures:
 1. Operating handle or valve for accessible water closets, urinals, lavatories, and sinks shall operate with less than 5 pounds force. Metering faucets shall be adjusted to operate between 10 and 15 seconds.
 2. Insulate exposed waste piping and domestic water supplies below accessible fixtures with CBC access code compliant molded "closed-cell" vinyl covers. Covers shall be installed using vandal resistant fasteners and must be removable. Covers shall meet flame spread rating not to exceed 25 and smoke density not to exceed 50 when tested in accordance with ASTM E-84, and shall comply with the requirements of California Code of Regulations, Title 24. Plumberex – Handy Shield, Johns Manville – Zeston 2000, or equal.
- C. Refrigerator Ice Maker Outlet Boxes:
 1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
 - a. Guy Gray.
 - b. Water-Tite.
- D. Dishwasher Air Gap Fittings:
 1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
 - a. Zurn Industries, LLC.
 - b. Dearborn Brass.

PART 3 - EXECUTION

3.01 PRODUCT HANDLING AND PROTECTION

- A. Deliver packaged materials in their original, unopened wrapping with labels intact. Protect materials from water, the elements and other damage during delivery, storage and handling.

3.02 PREPARATORY PROVISIONS

- A. The Contractor is responsible for the examination and acceptance of all conditions affecting the proper construction and/or installation of the Work of this Section. Do not proceed until all unsatisfactory conditions have been corrected. Commencing work will be construed as

acceptance of all conditions by the Contractor as satisfactory for the construction and/or installation of the Work.

3.03 INSPECTION AND PREPARATION

- A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the National Standard Plumbing Code pertaining to installation of plumbing fixtures.
- C. Fasten plumbing fixtures securely to supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies to blocking behind or within wall construction so as to be rigid, and not subject to pull or push movement.
- D. Install CBC accessible fixtures in accordance with Chapter 4 California Plumbing Code, and Chapters 11A and 11B California Building Code.
- E. Refer to Division 26 for wiring for electronic flush valves.

3.04 FAUCET INSTALLATION

- A. Provide 85 percent IPS red brass pipe, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to faucets, stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have a stop valve installed on water supply lines to permit repairs without shutting off water mains.
- B. Adjust metering faucets to run for 10 to 15 seconds.

3.05 CLEAN AND PROTECT

- A. Clean plumbing fixtures of dirt and debris upon completion of installation.
- B. Protect installed fixtures from damage during the remainder of the construction period.
- C. Grout voids between all fixtures and adjacent surfaces with white Dow Silicone Sealant, arranged to shed water.

3.06 FIELD QUALITY CONTROL

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

3.07 EXTRA STOCK

- A. General: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt. Furnish one device for every ten units.

END OF SECTION

SECTION 22 50 00 - PLUMBING EQUIPMENT**PART 1 - GENERAL****1.01 SUMMARY****A. SECTION INCLUDES**

1. Commercial electric water heaters.
2. Expansion tanks.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.03 ACTION SUBMITTALS

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.
- B. Product Data: Submit manufacturer's plumbing equipment specifications, installation and start-up instructions, capacity and ratings, with selection points clearly indicated.

1.04 INFORMATIONAL SUBMITTALS

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.

1.05 CLOSEOUT SUBMITTALS

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.
- B. Maintenance Data: Submit maintenance data and parts lists for each item of plumbing equipment. Include "trouble-shooting" maintenance guides. Include this data in Operation and Maintenance Manual.

1.06 QUALITY ASSURANCE

- A. For additional requirements, refer to Section 22 00 50, Basic Plumbing Materials and Methods.
- B. Trade names or catalog numbers stated herein indicates grade or quality of materials desired.
- C. Dimensions, sizes, and capacities shown are minimum and shall not be changed without permission of Architect.
- D. UL and NEMA Compliance: Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards.

- E. Pump types and sizes regulated by the US Department of Energy's "Energy Conservation Standards for Pumps" 10 CRF Parts 429 and 431 shall be marked with a compliant PEI_{CL} or PEI_{VL} (Pump Energy Index, constant or variable load) value, basic model number, and RPM on the nameplate. Regulated pumps shall be listed in the Hydraulic Institute (HI) Energy Rating database (er.pumps.org) and be assigned an Energy Rating as defined in the HI 40.5 program guide.
- F. CEC Compliance: Comply with California Electrical Code (Title 24, Part 3) as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.
- G. ASME Relief Valve Stamps: Provide water heaters with safety relief valves bearing ASME valve markings.
- H. ASME Code Symbol Stamps: For the following equipment, comply with ASME Boiler and Pressure Vessel Code for construction, and stamp with ASME Code symbol:
 - 1. Water Heaters 200 MBH and greater.
- I. California Energy Commission Compliance: Provide written confirmation of listing of all water heaters in the "Appliance Efficiency Database."

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver packaged materials in their original, unopened wrapping with labels intact. Protect materials from water, the elements and other damage during delivery, storage and handling.

1.08 WARRANTY

- A. Commercial Electric Water Heaters: Three-year minimum limited warranty on tank leakage.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 and NSF 372.
- B. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.02 COMMERCIAL ELECTRIC WATER HEATERS

- A. General: Provide commercial electric water heaters of size, capacity, and electrical characteristics indicated on Drawings. Comply with ASHRAE 90.1 for energy efficiency. Provide UL listing. Relief valve dip tube shall extend to within 3 inches of tank.
- B. Heater: Working pressure of 150 psi, magnesium anode rod; glass lining on internal surfaces exposed to water.
- C. Heating Elements: Heavy-duty, medium watt density, with incoloy sheath or zinc plated copper, thermostat stepped through magnetic contactor.
- D. Safety Controls: Double-pole, manual-reset, high-limit, probe type electric water low water cutoff; both factory wired.

- E. Jacket: Equip with full size control compartments with front panel opening. Insulate tank with vermin resistant polyurethane or glass fiber insulation. Provide outer steel jacket with bonderized undercoat and baked enamel finish.
- F. Provide the following accessories:
 - 1. Brass drain valve.
 - 2. 3/4 inch temperature and pressure relief valve.
 - 3. Thermometer.
- G. Provide equal flow manifold for piping entering and leaving the water heaters. Manifold shall be provided as a standard option for the heaters proposed.
- H. Controls: Adjustable immersion thermostat or surface mounted therm-o-disc; power circuit fusing.
- I. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - 1. Bradford White Corporation.
 - 2. Lochinvar Corporation.
 - 3. PVI Industries, LLC.
 - 4. Rheem Manufacturing Company.
 - 5. Smith, A.O. Water Products Co.; a division of A.O. Smith Corporation.

2.03 EXPANSION TANKS

- A. Provide thermal expansion tanks of size and number as indicated on Drawings, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75. Construct tank of welded steel for working pressure of 125 psi. Provide specially compounded flexible diaphragm securely sealed into tank to permanently separate air charge from system water, to maintain design expansion capacity.
 - 1. Tanks shall be IAPMO approved and listed for use with domestic water systems.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - 1. Amtrol, Inc.
 - 2. A.O. Smith Water Products Company.
 - 3. Watts Water Technologies, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. The Contractor shall be responsible for the examination and acceptance of all conditions affecting the proper construction and/or installation of the Work of this Section and shall not proceed until all unsatisfactory conditions have been corrected. Commencing work shall be

construed as acceptance of all conditions by the Contractor as satisfactory for the construction and/or installation of the Work.

3.02 ELECTRIC WATER HEATER INSTALLATION

- A. Install electric water heaters as indicated, in accordance with manufacturer's installation instructions and in compliance with applicable codes.
- B. Furnish wiring diagram to Electrical Installer. Refer to Division 26 for wiring of units, not work of this section.
- C. Connect to hot and cold water lines with shutoff valve, check valve, and dielectric union in the cold water line, and ASME standard pressure and temperature relief valve and dielectric union in the hot water line. Connect drain and relief piping as noted on Drawings.
- D. Start-up, test, and adjust electric water heaters in accordance with manufacturer's start-up instructions. Check and calibrate controls.
- E. After installation has been completed, seal bottom of heaters without feet to floor with silicone sealer.

3.03 DEMONSTRATION AND TRAINING

- A. Provide a minimum of 8 hours of training and orientation of Owners staff in proper care and operation of Plumbing Equipment.

3.04 CARE AND CLEANING

- A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Leave systems and equipment in satisfactory operating condition.

3.05 OPERATIONAL TESTS

- A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.06 CLEANING UP

- A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 23 00 50 - BASIC HVAC MATERIALS AND METHODS**PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
 - 1. Electric motors.
 - 2. Motor starters.
 - 3. Access Doors.
 - 4. Flexible joints.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. This Section is a part of each Division 23 Section.
- C. Refer to Section 23 08 00.13, T-24 Commissioning of HVAC for Title 24 commissioning requirements.

1.03 ADDITIONAL REQUIREMENTS

- A. Furnish and install incidental work not shown or specified necessary to provide a complete and workable system.
- B. Make all temporary connections required to maintain services, including adequate heat and cooling, during the course of the Contract without additional cost to Owner. Notify Owner seven days in advance before disrupting services.
- C. Provide for adjustments or modifications to fan and motor sheaves, belts, damper linkages, and other components as required to achieve specified air balance at no additional cost to Owner.

1.04 REFERENCES AND STANDARDS

- A. Where material or equipment is specified to conform to referenced standards, it shall be assumed that the most recent edition of the standard in effect at the time of bid shall be used.
 - 1. AABC - Associated Air Balance Council
 - 2. AFBMA - Anti Friction Bearing Manufacturer's Association
 - 3. AMCA - Air Moving and Control Association Inc.
 - a. Standard 210 - Laboratory Methods of Testing Fans
 - 4. ANSI - American National Standards Institute
 - 5. ARI - Air-Conditioning and Refrigeration Institute
 - 6. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers

7. ASME - American Society of Mechanical Engineers
 8. ASTM - American Society for Testing and Materials
 9. CCR - California Code of Regulations
 - a. Title 8 - Division of Industrial Safety, Subchapter 7; General Industry Safety Orders, Articles 31 through 36
 10. CSA – Canadian Standards Association International
 11. CSFM - California State Fire Marshal
 12. NCPWB - National Certified Pipe Welding Bureau
 13. NIST - National Institute of Standards and Technology
 14. NEMA - National Electrical Manufacturers' Association
 15. NFPA - National Fire Protection Association
 16. OSHA - Occupational Safety and Health Act
 17. SMACNA - Duct Manuals
 18. UL - Underwriters' Laboratories, Inc.
- B. Requirements of Regulatory Agencies:
1. The publications listed below form part of this specification; comply with provisions of these publications except as otherwise shown or specified.
 - a. California Building Code, 2022.
 - b. California Electrical Code, 2022.
 - c. California Energy Code, 2022.
 - d. California Fire Code, 2022.
 - e. California Green Building Standards Code, 2022.
 - f. California Mechanical Code, 2022.
 - g. California Plumbing Code, 2022.
 - h. California Code of Regulations, Title 24.
 - i. California Health and Safety Code.
 - j. CAL-OSHA.
 - k. California State Fire Marshal, Title 19 CCR.
 - l. National Fire Protection Association.
 - m. Occupational Safety and Health Administration.

- n. Other applicable state laws.
- 2. Nothing in Drawings or specifications shall be construed to permit work not conforming to these codes, or to requirements of authorities having jurisdiction. It is not the intent of Drawings or specifications to repeat requirements of codes except where necessary for clarity.

1.05 DRAWINGS

- A. Examine Drawings prior to bidding of work and report discrepancies in writing to Architect.
- B. Drawings showing location of equipment and materials are diagrammatic and job conditions will not always permit installation in location shown. The HVAC Drawings show general arrangement of equipment and materials, etc., and shall be followed as closely as existing conditions, actual building construction, and work of other trades permit.
 - 1. Architectural and Structural Drawings shall be considered part of the Work. These Drawings furnish Contractor with information relating to design and construction of the Project. Architectural Drawings take precedence over HVAC Drawings.
 - 2. Because of the small scale of HVAC Drawings, not all offsets, fittings, and accessories required are shown. Investigate structural and finish conditions affecting the Work and arrange Work accordingly. Provide offsets, fittings, and accessories required to meet conditions. Inform Architect immediately when job conditions do not permit installation of equipment and materials in the locations shown. Obtain the Architects approval prior to relocation of equipment and materials.
 - 3. Relocate equipment and materials installed without prior approval of the Architect. Remove and relocate equipment and materials at Contractors' expense upon Architects' direction.
 - 4. Minor changes in locations of equipment, piping, ducts, etc., from locations shown shall be made when directed by the Architect at no additional cost to the Owner providing such change is ordered before such items of work, or work directly connected to same are installed and providing no additional material is required.
- C. Execute work mentioned in the Specifications and not shown on the Drawings, or vice versa, the same as if specifically mentioned or shown in both.

1.06 FEES AND PERMITS

- A. Obtain and pay for permits and service required in installation of the Work. Arrange for required inspections and secure approvals from authorities having jurisdiction. Comply with requirements of Division 01.
- B. Arrange for utility connections and pay charges incurred, including excess service charges.
- C. Coordination:
 - 1. General:
 - a. Coordinate HVAC Work with trades covered in other Specifications Sections to provide a complete, operable and sanitary installation of the highest quality workmanship.

2. Have fire damper and fire smoke damper installation instructions available at Project site during construction for use by Project Inspector.
3. Electrical Coordination:
 - a. Refer to the Electrical Drawings and Specifications, Division 26, for service voltage and power feed wiring for equipment specified under this section. Contractor has full responsibility for the following items of work:
 - 1) Review the Electrical Drawings and Division 26 Specifications to verify that electrical services provided are adequate and compatible with equipment requirements.
 - 2) If additional electrical services are required above that indicated on Electrical Drawings and in Division 26, such as more control interlock conductors, larger feeder, or separate 120 volt control power source, include cost to furnish and install additional electrical services as part of the bid.
 - 3) Prior to proceeding with installation of additional electrical work, submit detailed drawings indicating exact scope of additional electrical work.
4. Mechanical Coordination:
 - a. Arrange for pipe spaces, chases, slots and openings in building structure during progress of construction, to accommodate mechanical system installation.
 - b. Coordinate installation of supporting devices. Set sleeves in poured-in-place concrete and other structural components during construction.
 - c. Coordinate requirements for access panels and doors for mechanical items requiring access where concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."
 - d. Coordinate with other trades equipment locations, pipe, duct and conduit runs, electrical outlets and fixtures, air inlets and outlets, and structural and architectural features. Provide information on location of piping and seismic bracing to other trades as required for a completely coordinated project.

1.07 SUBMITTALS - GENERAL

- A. Refer to Division 01 Submittals Section(s) for additional requirements.
- B. Submittal packages may be submitted via email as PDF electronic files, or as printed packages. PDFs shall be legible at actual size (100 percent). Provide seven copies of printed submittal packages.
- C. Provide submittal of materials proposed for use as part of this Project. Product names in Specifications and on Drawings are used as standards of quality. Furnish standard items on specified equipment at no extra cost to the Contract regardless of disposition of submittal data. Other materials or methods shall not be used unless approved in writing by Architect. Architect's review will be required even though "or equal" or synonymous terms are used.
 1. Partial or incomplete submittals will not be considered.
 2. Quantities are Contractor's responsibility and will not be reviewed.

3. Provide materials of the same brand or manufacturer for each class of equipment or material.
 4. Identify each item by manufacturer, brand, trade name, number, size, rating, or other data necessary to properly identify and review materials and equipment. Words "as specified" are not sufficient identification.
 5. Identify each submittal item by reference to items' Specification Section number and paragraph, by Drawing and detail number, and by unit tag number.
 6. Organize submittals in same sequence as in Specification Sections.
 7. Show physical arrangement, construction details, finishes, materials used in fabrications, provisions for piping entrance, access requirements for installation and maintenance, physical size, mechanical characteristics, foundation and support details, and weight.
 - a. Submit Shop Drawings, performance curves, and other pertinent data, showing size and capacity of proposed materials.
 - b. Specifically indicate, by drawn detail or note, that equipment complies with each specifically stated requirement of Contract Documents.
 - c. Drawings shall be drawn to scale and dimensioned (except schematic diagrams). Drawings may be prepared by vendor but must be submitted as instruments of Contractor, thoroughly checked and signed by Contractor before submission to Architect for review.
 - d. Catalog cuts and published material may be included with supplemental scaled drawings.
- D. Review of submittals will be only for general conformance with design concept and general compliance with information given in Contract Documents. Review will not include quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with work of other trades, or construction safety precautions, which are sole responsibility of Contractor. Review of a component of an assembly does not indicate acceptance of an assembly. Deviations from Contract Documents not clearly identified by Contractor are Contractor's responsibility and will not be reviewed by Architect.
- E. Within reasonable time after award of contract and in ample time to avoid delay of construction, submit to Architect shop drawings or submittals on all items of equipment and materials provided. Provide submittal as a complete package.
1. Shop drawings and submittals shall include Specification Section, Paragraph number, and Drawing unit symbol or detail number for reference. Organize submittals into booklets for each Specification section and submit in loose-leaf binders with index. Deviations from the Contract Documents shall be prominently displayed in the front of the submittal package and referenced to the applicable Contract requirement.
- F. Furnish to the Project Inspector complete installation instructions on material and equipment before starting installation.

1.08 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing systems materials and products.

- B. Shop Drawings.
- C. Sustainable Design Submittals:
 - 1. Product Data: For adhesives and sealants, documentation of compliance including printed statement of VOC content and chemical components.
 - 2. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
- D. Delegated-Design Submittals: For seismic supports, anchorages, restraints, and vibration isolators indicated to comply with performance requirements and design criteria.
 - 1. Calculations performed for use in selection of seismic supports, anchorages, restraints, and vibration isolators shall utilize criteria indicated in Structural Contract Documents.
 - 2. Include design calculations and details for selecting vibration isolators and vibration isolation bases complying with performance requirements, design criteria, and analysis data signed and sealed by the California registered structural engineer responsible for their preparation.
 - 3. Supports, anchorage and restraints for piping, ductwork, and equipment shall be an HCAI pre-approved system such as TOLCO, ISAT, Mason, or equal. Pipes, ducts and equipment shall be seismically restrained in accordance with requirements of current edition of California Building Code. System shall have current OPM number and shall meet additional requirements of authority having jurisdiction. Provide supporting documentation required by the reviewing authority and the Architect and Engineer. Provide layout drawings showing piping, ductwork and restraint locations.
 - a. Bracing of Piping, Ductwork, and Equipment: Specifically state how bracing attachment to structure is accomplished. Provide shop drawings indicating seismic restraints, including details of anchorage to building. In-line equipment must be braced independently of piping and ductwork, and in conformance with applicable building codes. Provide calculations to show that pre-approval numbers have been correctly applied in accordance with general information notes of pre-approval documentation.
 - b. In lieu of the above or for non-standard installations not covered in the above pre-approved systems, Contractor shall provide layout drawings showing piping, ductwork, and restraint locations, and detail supports, attachments and restraints, and furnish supporting calculations and legible details sealed by a California registered structural engineer, in accordance with 2016 California Building Code
 - 4. Additional Requirements: In addition to the above, conform to all state and local requirements.

1.09 INFORMATIONAL SUBMITTALS

- A. Provide coordinated layouts for HVAC Ductwork systems, in accordance with Specification Section 23 80 00.
- B. Provide evidence of equipment certification to California Energy Code Section 110.1 or 110.2, if not providing Electrically Commutated motors for HVAC fans sized below 1 hp and above 1/12 hp. Refer to specific equipment articles requiring electrically commutated motors.
- C. Check, Test, and Start forms, from equipment manufacturers.

D. Check, Test and Start reports.

1.10 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Furnish three complete sets of Operation and Maintenance Manual bound in hardboard binder, and one compact disc containing complete Operation and Maintenance Manual in searchable PDF format. Provide Table of Contents. Provide index tabs for each piece of equipment in binder and disc. Begin compiling data upon approval of submittals.
 - a. Sets shall incorporate the following:
 - 1) Product Data.
 - 2) Shop Drawings.
 - 3) Record Drawings.
 - 4) Service telephone number, address and contact person for each category of equipment or system.
 - 5) Complete operating instructions for each item of heating, ventilating and air conditioning equipment.
 - 6) Copies of guarantees/warranties for each item of equipment or systems.
 - 7) Test data and system balancing reports.
 - 8) Typewritten maintenance instructions for each item of equipment listing lubricants to be used, frequency of lubrication, inspections required, adjustment, etc.
 - 9) Manufacturers' bulletins with parts numbers, instructions, etc., for each item of equipment.
 - 10) Temperature control diagrams and literature.
 - 11) Check test and start reports for each piece of mechanical equipment provided as part of the Work.
 - 12) Commissioning and Preliminary Operation Tests required as part of the Work.
 2. Post service telephone numbers and addresses in an appropriate place designated by Architect.

B. Record Drawings:

1. Refer to Division 01 for additional requirements.
2. Upon completion of the Work, deliver to Architect the following:
 - a. Originals of drawings showing the Work exactly as installed.
 - b. One complete set of reproducible drawings showing the Work exactly as installed.

- c. One compact disc with complete set of drawings in PDF format showing the Work exactly as installed.
- d. Provide Contractor's signature, verifying accuracy of record drawings.
- e. Obtain the signature of the Inspector of Record for Record Drawings.

1.11 SUBSTITUTIONS

- A. Refer to Division 01 for complete instructions. Requirements given below are in addition to or are intended to amplify Division 01 requirements. In case of conflict between requirements given herein and those of Division 01, Division 01 requirements shall apply.
- B. It is the responsibility of Contractor to assume costs incurred because of additional work and or changes required to incorporate proposed substitute into the Project. Refer to Division 01 for complete instructions.
- C. Substitutions will be interpreted to be manufacturers other than those specifically listed in the Contract Documents by brand name, model, or catalog number.
- D. Only one request for substitution will be considered for each item of equipment or material.
- E. Substitution requests shall include the following:
 - 1. Reason for substitution request.
 - 2. Complete submittal information as described herein; see "Submittals."
 - 3. Coordinated scale layout drawings depicting position of substituted equipment in relation to other work, with required clearances for operation, maintenance and replacement.
 - 4. List optional features required for substituted equipment to meet functional requirements of the system as indicated in Contract Documents.
 - 5. Explanation of impact on connected utilities.
 - 6. Explanation of impact on structural supports.
- F. Installation of reviewed substitution is Contractors' responsibility. Any mechanical, electrical, structural, or other changes required for installation of substituted equipment or material must be made by Contractor without additional cost to Owner. Review by Architect of substituted equipment or material, will not waive these requirements.
- G. Contractor may be required to compensate Architect for costs related to substituted equipment or material.

1.12 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of HVAC systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with HVAC systems work similar to that required for this Project.

- C. Comply with applicable portions of California Mechanical Code pertaining to selection and installation of HVAC materials and products.
- D. All materials and products shall be new.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Protect equipment and materials delivered to Project site from weather, humidity and temperature variations, dirt, dust and other contaminants.

1.14 FIELD CONDITIONS

- A. Contractor shall visit Project site and examine existing conditions in order to become familiar with Project scope. Verify dimensions shown on Drawings at Project site. Bring discrepancies to the attention of Architect. Failure to examine Project site shall not constitute basis for claims for additional work because of lack of knowledge or location of hidden conditions that affect Project scope.
- B. Information on Drawings relative to existing conditions is approximate. Deviations from Drawings necessary during progress of construction to conform to actual conditions shall be approved by the Architect and shall be made without additional cost to the Owner. The Contractor shall be held responsible for damage caused to existing services. Promptly notify the Architect if services are found which are not shown on Drawings.

1.15 WARRANTY

- A. Refer to Division 01 for warranty requirements, and duration and effective date of Contractor's Standard Guarantee.
- B. Repair or replace defective work, material, or part that appears within the warranty period, including damage caused by leaks.
- C. On failure to comply with warranty requirements within a reasonable length of time after notification is given, Architect/Owner shall have repairs made at Contractor's expense.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Materials or equipment of the same type shall be of the same brand wherever possible. All materials shall be new and in first class condition.
- B. All sizes, capacities, and efficiency ratings shown are minimum, except that gas capacity is maximum available.
- C. Refer to Division 22 10 00 and 23 80 00 for specific system piping materials.

2.02 MATERIALS

- A. No material installed as part of this Work shall contain asbestos.
- B. California Green Building Code Compliance:
 1. HVAC and refrigeration equipment shall not contain CFCs.
 2. HVAC and refrigeration equipment shall not contain Halons.

2.03 ELECTRIC MOTORS

- A. General Motor Requirements: Comply with NEMA MG 1 unless otherwise indicated. Comply with IEEE 841 for severe-duty motors.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. U.S. Motors.
 - b. Century Electric.
 - c. General Electric.
 - d. Lincoln.
 - e. Gould.
- B. Motor Characteristics: Designed for continuous duty at ambient temperature of 40 deg. C and at altitude of 3300 feet above sea level. Capacity and torque shall be sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
1. Motors exceeding the nameplate amperage shall be promptly replaced at no cost to the Owner. Horsepower shown is minimum and shall be increased as necessary to comply with above requirements. Furnish motors with splash-proof or weatherproof housings, where required or recommended by the manufacturer. Match the nameplate voltage rating with the electrical service supplied. Check Electrical Drawings. Provide a transformer for each motor not wound specifically for system voltage.
- C. Polyphase Motors: NEMA MG 1, Design B, medium induction motor, premium efficiency as defined in NEMA MG 1. Select motors with service factor of 1.15. Provide motor with random-wound, squirrel cage rotor, and permanently lubricated or regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading. Temperature rise shall match insulation rating. Provide Class F insulation.
1. Multispeed motors shall have separate windings for each speed.
- D. Polyphase Motors with Additional Requirements:
1. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
 2. Motors Used with Variable Frequency Controllers:
 - a. Separately Connected Motors: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - b. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - c. Premium-Efficient Motors: Class B temperature rise; Class F insulation.

- d. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - e. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
 - f. Each motor shall be provided with a shaft grounding device for stray current protection.
3. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.
- E. Single-Phase Motors:
1. Select motors with service factor of 1.15.
 2. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - a. Permanent-split capacitor.
 - b. Split phase.
 - c. Capacitor start, inductor run.
 - d. Capacitor start, capacitor run.
 3. Motors for HVAC exhaust, transfer, and supply fans larger than 1/12 hp and smaller than 1 hp shall be the following:
 - a. Electronically Commutated motor (EC type): Motor shall be electronically commutated type specifically designed for applications, with heavy duty ball bearings. The motor shall be speed controllable down to 20% of full speed and 85% efficient at all speeds.
 - 1) Exceptions:
 - a) Motors in fan-coils and terminal units that operate only when providing heating to the space served.
 - b) Motors installed in space conditioning equipment certified under California Energy Code Section 110.1 or 110.2.
 4. Contractor's Option: Motors scheduled on Drawings as single-phase, and larger than 1/12 hp and smaller than 1 hp, for applications other than HVAC fans, may be EC type.
 5. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
 6. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
 7. Motors 1/20 HP and Smaller: Shaded-pole type.
 8. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.04 MOTOR STARTERS

- A. Square D, Allen Bradley, or equal, in NEMA Type 1 enclosure, unless otherwise specified or required. Minimum starter size shall be Size 1. Provide NEMA 3R enclosure where exposed to outdoors.
- B. Provide magnetic motor starters for all equipment provided under the Mechanical Work. Starters shall be non-combination type. Provide part winding or reduced voltage start motors where shown or as hereinafter specified. Minimum size starter shall be Size 1.
 - 1. All starters shall have the following:
 - a. Cover mounted hand-off-automatic switch. Starters installed exposed in occupied spaces shall have key operated HOA switch.
 - b. Ambient compensated thermal overload.
 - c. Fused control transformer (for 120 or 24 volt service).
 - d. Pilot lights, integral with the starters. Starters located outdoors shall be in NEMA IIIIR enclosures.
 - 2. Where three phase motors are provided for two-speed operation, provide two speed motor starters.
 - 3. Starters for single-phase motors shall have thermal overloads. NEMA I enclosure for starters located indoors, NEMA IIIIR enclosure for starters located outdoors.
 - 4. Provide OSHA label indicating the device starts automatically.

2.05 ACCESS DOORS

- A. Where floors, walls, or ceilings must be penetrated for access to mechanical equipment, provide access doors, 14 inch by 14 inch minimum size in usable opening. Where entrance of a serviceman may be required, provide 20 inch by 30 inch minimum usable opening. Locate access doors/panels for non-obstructed and easy reach.
 - 1. All access doors less than 7'-0" above floors and exposed to public access shall have keyed locks.
- B. Access doors shall match those supplied in Division 08 in all respects, except as noted herein.
- C. Provide stainless steel access doors for use in toilet rooms, shower rooms, kitchens and other damp areas. Provide steel access doors with prime coat of baked-on paint for all other areas.
- D. Where panels are located on ducts or plenums, provide neoprene gaskets to prevent air leakage, and use frames to set door out to flush with insulation.
- E. Provide insulated doors where located in internally insulated ducts or casings.
- F. Do not locate access doors in highly visible public areas such as lobbies, waiting areas, and primary entrance areas. Coordinate with the Architect when access is required in these areas.

- G. Where specific information or details relating to access panels different from the above is shown or given on the Drawings or other Divisions of work, then that information shall supersede this specification.
- H. Manufacturers: Subject to compliance with requirements, available manufacturers offering products which may be incorporated into the Work include Milcor, Karp, Nystrom, or Cesco, equal to the following:
 - 1. Milcor
 - a. Style K (plaster).
 - b. Style DW (gypsum board).
 - c. Style M (Masonry).
 - d. Style "Fire Rated" where required.

2.06 EQUIPMENT IDENTIFICATION

- A. Identify each piece of equipment with a permanently attached engraved bakelite plate, 1/2 inch high white letters on black background.

PART 3 - EXECUTION

3.01 EXISTING MATERIALS

- A. Remove existing equipment, piping, wiring, construction, etc., which interferes with Work of this Contract. Promptly return to service upon completion of work in the area. Replace items damaged by Contractor with new material to match existing.
- B. Removed materials which will not be re-installed and which are not claimed by Owner shall become the property of Contractor and shall be removed from the Project site. Consult Owner before removing any material from the Project site. Carefully remove materials claimed by Owner to prevent damage and deliver to Owner-designated storage location.
- C. Existing piping and wiring not reused and are concealed in building construction may be abandoned in place and all ends shall be capped or plugged. Remove unused piping and wiring exposed in Equipment Rooms or occupied spaces. Material shall be removed from the premises. Disconnect power, water, gas, pump or any other active energy source from piping or electrical service prior to abandoning in place.

3.02 FRAMING, CUTTING, AND PATCHING

- A. Special framing, recesses, chases and backing for Work of this Section, unless otherwise specified, are covered under other Specification Sections.
- B. Contractor is responsible for placement of pipe sleeves, hangers, inserts, supports, and location of openings for the Work.
- C. Cutting, patching, and repairing of existing construction to permit installation of equipment, and materials is the responsibility of Contractor. Repair or replace damage to existing work with skilled mechanics for each trade.
- D. Cut existing concrete construction with a concrete saw. Do not utilize pneumatic devices.

- E. Core openings through existing construction for passage of new piping and conduits. Cut holes of minimum diameter to suit size of pipe and associated insulation installed. Coordinate with building structure, and obtain Structural Engineer's approval prior to coring through existing construction.

3.03 MECHANICAL DEMOLITION

- A. Refer to Division 01 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, dismantle and remove mechanical systems, equipment, and components indicated to be removed. Coordinate with all other trades.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping to remain with same or compatible piping material. Refrigerant system must be evacuated per EPA requirements.
 - 3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and cap remaining ducts with same or compatible ductwork material.
 - 4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
 - 5. Equipment to Be Removed: Drain down and cap remaining services and remove equipment.
 - 6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - 7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.04 ELECTRICAL REQUIREMENTS

- A. Provide adequate working space around electrical equipment in compliance with the California Electrical Code. Coordinate the Mechanical Work with the Electrical Work to comply.
- B. Furnish necessary control diagrams and instructions for the controls. Before permitting operation of any equipment which is furnished, installed, or modified under this Section, review all associated electrical work, including overload protection devices, and assume complete responsibility for the correctness of the electrical connections and protective devices. Motors and control equipment shall conform to the Standards of the National Electrical Manufacturers' Association. All equipment and connections exposed to the weather shall be NEMA IIIIR with factory-wired strip heaters in each starter enclosure and temperature control panel where required to inhibit condensation.

- C. All line voltage and low voltage wiring and conduit associated with the Temperature Control System are included in this Section. Wiring and conduit shall comply with Division 26.

3.05 PIPING SYSTEM REQUIREMENTS

- A. Drawing plans, schematic and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

3.06 PRIMING AND PAINTING

- A. Perform priming and painting on the equipment and materials as specified herein.
- B. See Division 09 Painting Section(s) for detailed requirements.
- C. Priming and painting:
1. Exposed ferrous metals, including piping, which are not galvanized or factory-finished shall be primed and painted.
 - a. Black Steel Piping:
 - 1) Primer: One coat gray Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, comparable products by Rust-Oleum, Kelly Moore, or equal.
 - 2) Topcoat: Two coats gray Sherwin-Williams Pro Industrial Waterbased Alkyd Urethane Enamel, comparable products by Rust-Oleum, Kelly Moore, or equal.
 - b. Interior Ductwork: Refer to Division 09 Painting Section(s). Architect shall select paint color.
 2. Metal surfaces of items to be jacketed or insulated except ductwork and piping shall be given two coats of primer unless furnished with equivalent factory finish. Items to be primed shall be properly cleaned by effective means free of rust, dirt, scale, grease and other deleterious matter and then primed with the best available grade of zinc rich primer. After erection or installation, all primed surfaces shall be properly cleaned of any foreign or deleterious matter that might impair proper bonding of subsequent paint coatings. Any abrasion or other damage to the shop or field prime coat shall be properly repaired and touched up with the same material used for the original priming.
 3. Where equipment is provided with nameplate data, the nameplate shall be masked off prior to painting. When painting is completed, remove masking material.

3.07 EXCAVATING

- A. Perform all excavating required for work of this Section. Provide the services of a pipe/cable locating service prior to excavating activities to determine location of existing utilities.
- B. Unless shown otherwise, provide a minimum of 2'-6" cover above top of pipe to finished grade for all service piping, unless otherwise noted. Trim trench bottom by hand or provide a 4 inch deep minimum bed of sand to provide a uniform grade and firm support throughout entire length of pipe. For all PVC pipe and for PE gas pipe, bed the pipe in 4 inch sand bed. Pipe bedding materials should be clean crushed rock, gravel or sand of which 100 percent will pass a 1 inch sieve. For pipes that are larger than 10 inches in diameter, at least 95

percent should pass a 3/4 inch sieve, and for pipes 10 inches in diameter or smaller, 100 percent should pass a 1/2 inch sieve. All other materials should have a minimum sand equivalent of 50. Only a small proportion of the native soils will meet these requirements without extensive processing; therefore, importation of pipe bedding materials should be anticipated. Pipe bedding materials shall be compacted in lifts not exceeding 6 inches in compacted thickness. Each lift shall be compacted to not less than 90 percent relative compaction at or above the optimum moisture content, in accordance with ASTM Specification D2940, except that bedding materials graded such 100 percent of the material will pass a No. 200 sieve shall be compacted in 6 inch lifts using a single pass of a flat-plate, vibratory compactor or vibratory drum. Pipe bedding materials should extend at least to the spring line.

- C. Maintain all warning signs, barricades, flares, and red lanterns as required.
- D. For all trenches 5 feet or more in depth, submit copy of permit detailed drawings showing shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trenches. Obtain a permit from the Division of Industrial Safety prior to beginning excavations. A copy of the permit shall be available at the site at all times.

3.08 BACKFILLING

- A. Backfill shall comply with applicable provisions of Division 31 of these Specifications.
- B. Except under existing or proposed paved areas, walks, roads, or similar surfaces, backfill for other types of pipe shall be made using suitable excavated material or other approved material. Place backfill in 8 inch layers, measured before compaction, and compact with impact hammer to at least 90 percent relative compaction per ASTM D2940.
 - 1. Backfill plastic pipe and insulated pipe with sand for a minimum distance of 12 inches above the top of the pipe. Compact using mechanical tamping equipment.
- C. Entire backfill for excavations under existing or proposed pavements, walks, roads, or similar surfaces, under new slabs on grade, shall be made with clean sand compacted with mechanical tamping equipment vibrator to at least 90 percent relative compaction per ASTM D2940. Remove excess earth. Increase the minimum compaction within the uppermost two feet of backfill to 95 percent.
- D. Replace or repair to its original condition all sod, concrete, asphalt paving, or other materials disturbed by the trenching operation. Repair within the guarantee period as required.

3.09 UNION AND FLANGE INSTALLATION

- A. Install Epco, Nibco, or equal, dielectric unions or flanges at points of connection between copper or brass piping or material and steel or cast iron pipe or material except in drain piping. Bushings or couplings shall not be used.
- B. Install unions in piping NPS 2" and smaller 3 or flanges in piping NPS 2-1/2" and larger whether shown or not at each connection to all equipment and tanks, and at all connections to all automatic valves, such as temperature control valves.
- C. Locate the unions for easy removal of the equipment, tank, or valve.
- D. Do not install unions or flanges in refrigerant piping systems.

3.10 ACCESS DOOR INSTALLATION

- A. Furnish and install access doors wherever required whether shown or not for easy maintenance of mechanical systems; for example, at concealed valves, strainers, traps, cleanouts, dampers, motors, controls, operating equipment, etc. Access doors shall provide for complete removal and replacement of equipment.

3.11 CONCRETE WORK

- A. Concrete work required for work of this Section shall be included under another section of the Specification, unless otherwise noted, including poured-in-place concrete work for installing precast manholes, catch basins, etc., and shall include reinforced concrete bases for pumps, tanks, compressors, fan units, boilers, unless the work is specifically indicated on the Drawings to be furnished under this Section.
- B. Underground anchors, and pads for valve access boxes are included under this Section of the Specification. Concrete shall be 3000 psi test minimum. Refer to Division 03 for concrete types.

3.12 PIPE PROTECTION

- A. Wrap bare galvanized and black steel pipe buried in the ground and to 6" above grade, including piping in conduit, with one of the following, or equal:
 - 1. Polyethylene Coating: Pressure sensitive polyethylene coating, "X-Tru-Coat" as manufactured by Pipe Line Service Corporation or "Green Line" wrap as manufactured by Royston Products, or equal.
 - a. Field Joints and Fittings: Protecto Wrap #1170 tape as manufactured by Pipe Line Service Corporation, or Primer #200 tape by Royston Products, or equal. Installation shall be as per manufacturer's recommendation and instructions.
 - 2. Tape Wrap: Pressure-sensitive polyvinyl chloride tape, "Transtex #V-10 or V-20", "Scotchwrap 50", Slipknot 100, PASCO Specialty & Mfg., Inc., or equal, with continuous identification. Tape shall be a minimum of 20 mils thick for fittings and irregular surfaces, two wraps, 50 percent overlap, 40 mils total thickness. Tape shall be laminated with a suitable adhesive; widths as recommended by the manufacturer for the pipe size. Wrap straight lengths of piping with an approved wrapping machine.
- B. Field Joints: Valves and Fittings: double wrap polyvinyl chloride tape as above. Provide at least two thicknesses of tape over the joint and extend a minimum of 4 inches over adjacent pipe covering. Build up with primer to match adjacent covering thickness. Width of tape of fittings shall not exceed 3 inches. Tape shall adhere tightly to all surfaces of the fittings without air pockets.
- C. Testing: Test completed wrap of piping, including all epoxy painted piping with Tinker and Razor Co. holiday detector, or equal.
- D. Cleaning: Clean all piping thoroughly before wrapping.
 - 1. Inspection: Damaged or defective wraps shall be repaired as directed. No wrapped pipe shall be covered until approved by Architect.
- E. Covering: No rocks or sharp edges shall be backfilled against the wrap. When backfilling with other than sand, protect wrap with an outer wrapping of Kraft paper; leave in place during backfill.

3.13 PIPING SYSTEM PRESSURE TESTING

- A. General:
 - 1. Perform operational tests under simulated or actual service conditions.
 - 2. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- B. Piping Systems: Test the installations in accordance with the following requirements and applicable codes:
 - 1. Notify the Architect at least seven days in advance of testing.
 - 2. Authority having jurisdiction shall witness tests of piping systems.
 - 3. Piping shall be tested at completion of roughing-in, or at other times as directed by the Architect.
 - 4. Furnish necessary materials, test pumps, gases, instruments and labor required for testing.
 - 5. Isolate from system equipment that may be damaged by test pressure.
 - 6. Test Schedule: No loss in pressure or visible leaks shall show after four hours at the pressures indicated.

<u>System Tested</u>	<u>Test Pressure PSI</u>	<u>Test With</u>
All Hot, Chilled, Combination, Condenser Water Piping	Greater of 1-1/2 x WP or 100 psi	Water

3.14 OPERATION OF SYSTEMS

- A. Do not operate any mechanical equipment for any purpose, temporary or permanent, until all of the following has been completed:
 - 1. Complete all requirements listed under “Check, Test and Start Requirements.”
 - 2. Ductwork and piping has been properly cleaned. Piping systems shall be flushed and treated prior to operation.
 - 3. Filters, strainers etc. are in place.
 - 4. Bearings have been lubricated, and alignment of rotating equipment has been checked.
 - 5. Equipment has been run under observation, and is operating in a satisfactory manner.
- B. Provide test and balance agency with one set of Contract Drawings, Specifications, Addenda, Change orders issued, applicable shop drawings and submittals and temperature control drawings.

3.15 CHECK, TEST AND START REQUIREMENTS

- A. An authorized representative of the equipment manufacturer shall perform check, test and start of each piece of mechanical equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the check test and start of the equipment.
1. As part of the submittal process, provide a copy of each manufacturer's printed startup form to be used.
 2. Some items of specified equipment may require that check, test and start of equipment must be performed by the manufacturer, using manufacturer's employees. See specific equipment Articles in these Specifications for this requirement.
 3. Provide all personnel, test instruments, and equipment to properly perform the check, test and start work.
 4. When work has been completed, provide copies of reports for review, prior to final observation of work.
- B. Provide copies of the completed check, test and start report of each item of equipment, bound with the Operation and Maintenance Manual.
- C. Upon completion of the work, provide a schedule of planned maintenance for each piece of equipment. Indicate frequency of service, recommended spare parts (including filters and lubricants), and methods for adjustment and alignment of all equipment components. Provide a copy of the schedule with each Operation and Maintenance Manual. Provide a copy of certification from the Owner's representative indicating that they have been properly instructed in maintenance requirements for the equipment installed.

3.16 PRELIMINARY OPERATIONAL REQUIREMENTS AND TESTS

- A. Prior to observation to determine final acceptance, put HVAC, plumbing, and fire protection systems into service and check that work required for that purpose has been done, including but not limited to the following condensed check list. Provide indexed report to tabulating the results of all work.
1. All equipment has been started, checked, lubricated and adjusted in accordance with the manufacturer's recommendations, including modulating power exhausts if present.
 2. Correct rotation of motors and ratings of overload heaters are verified.
 3. Specified filters are installed and spare filters have been turned over to Owner.
 4. All manufacturers' certificates of start-up specified have been delivered to the Owner.
 5. All equipment has been cleaned, and damaged painted finishes touched up.
 6. Damaged fins on heat exchangers have been combed out.
 7. Missing or damaged parts have been replaced.
 8. Flushing and chemical treatment of piping systems has been completed and water treatment equipment, where specified, is in operation.

9. Equipment labels, pipe marker labels, ceiling markers and valve tags are installed.
 10. Valve tag schedules, corrected control diagrams, sequence of operation lists and start-stop instructions have been posted.
 11. Preliminary test and balance work is complete, and reports have been forwarded for review.
 12. Automatic control set points are as designated and performance of controls checks out to agree with the sequence of operation.
 13. Operation and Maintenance Manuals have been delivered and instructions to the operating personnel have been made.
- B. Prior to the observation to determine final acceptance, operate all mechanical systems as required to demonstrate that the installation and performance of these systems conform to the requirements of these specifications.
1. Operate and test all mechanical equipment and systems for a period of at least five consecutive 8 hour days to demonstrate the satisfactory overall operation of the project as a complete unit.
 2. Include operation of heating and air conditioning equipment and systems for a period of not less than two 8 hour days at not less than 90 percent of full specified heating and cooling capacities in tests.
 3. Commence tests after preliminary balancing and adjustments to equipment have been checked. Immediately before starting tests, install air filters and lubricate all running equipment. Notify the Architect at least seven calendar days in advance of starting the above tests.
 4. During the test period, make final adjustments and balancing of equipment, systems controls, and circuits so that all are placed in first class operating condition.
 5. Where Utility District rebates are applicable, demonstrate that the systems meet the rebate program requirements.
- C. Before handing over the system to Owner replace all filters with complete new set of filters.
- D. Review of Contractor's Tests:
1. All tests made by the Contractor or manufacturers' representatives are subject to observation and review by the Owner. Provide timely notice prior to start of each test, in order to allow for observation of testing. Upon the completion of all tests, provide a letter to confirm that all testing has been successful.
- E. Test Logs:
1. Maintain test logs listing the tests on all mechanical systems showing dates, items tested, inspectors' names, remarks on success or failure of the tests.
- F. Preliminary Operation:
1. The Owner reserves the right to operate portions of the mechanical system on a preliminary basis without voiding the guarantee.

G. Operational Tests:

1. Before operational tests are performed, demonstrate that all systems and components are complete and fully charged with operating fluid and lubricants.
2. Systems shall be operable and capable of maintaining continuous uninterrupted operation during the operating and demonstration period. After all systems have been completely installed, connections made, and tests completed, operate the systems continuously for a period of five working days during the hours of a normal working day.
3. This period of continuous systems operation may be coordinated with the removal of Volatile Organic Compounds (VOCs) from the building prior to occupancy should the Owner decide to implement such a program.
4. Control systems shall be completely operable with settings properly calibrated and adjusted.
5. Rotating equipment shall be in dynamic balance and alignment.
6. If the system fails to operate continuously during the test period, the deficiencies shall be corrected and the entire test repeated.

H. Pre-Occupancy Building Purge:

1. Prior to occupancy, ventilate the building on 100 percent outside air, 100 percent exhaust for a continuous period determined by a qualified industrial hygienist (engaged by the Contractor) to reduce V.O.C's prior to occupancy.
2. Submit report by the industrial hygienist verifying satisfactory completion of the pre-occupancy purge.

3.17 DEMONSTRATION AND TRAINING

- A. An authorized representative of the equipment manufacturer shall train Owner-designated personnel in maintenance and adjustment of equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the Owner training for the equipment installed.
1. As part of the submittal process, provide a training agenda outlining major topics and time allowed for each topic.
 2. Some items of specified equipment require that training must be performed by the manufacturer, using manufacturer's employees. See specific equipment Articles in these Specifications for this requirement.
 3. Contractor shall provide three copies of certification by Contractor that training has been completed, signed by Owner's representative, for inclusion in Operation and Maintenance Manual. Certificates shall include:
 - a. Listing of Owner-designated personnel completing training, by name and title.
 - b. Name and title of training instructor.
 - c. Date(s) of training.

- d. List of topics covered in training sessions.
- 4. Refer to specific equipment Articles for minimum training period duration for each piece of equipment.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - 2. Balancing Domestic Water Piping Systems.

1.02 RELATED REQUIREMENTS

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

1.03 REFERENCES AND STANDARDS

- A. Associated Air Balance Council (AABC)
 - 1. National Standards for Total System Balance, latest edition.
- B. National Environmental Balancing Bureau (NEBB)
 - 1. Procedural Standards for Testing and Balancing of Environmental Systems, latest edition.

1.04 DEFINITIONS

- A. The intent of this Section is to use the standards pertaining to the TAB specialist engaged to perform the Work of this Contract, with additional requirements specified in this Section. Contract requirements take precedence over corresponding AABC or NEBB standards requirements. Differences in terminology between the Specifications and the specified TAB organization standards do not relieve the TAB entity engaged to perform the Work of this Contract of responsibility from completing the Work as described in the Specifications.
- B. Similar Terms: The following table is provided for clarification only:

<u>Similar Terms</u>		
Contract Term	AABC Term	NEBB Term
TAB Specialist	TAB Agency	NEBB Certified Firm
TAB Standard	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems	Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems
TAB Field Supervisor	Test and Balance Engineer	Test and Balance Supervisor

- C. AABC: Associated Air Balance Council.
- D. NEBB: National Environmental Balancing Bureau.
- E. TAB: Testing, adjusting, and balancing.
- F. TAB Organization: Body governing practices of TAB Specialists.
- G. TAB Specialist: An entity engaged to perform TAB Work.

1.05 ACTION SUBMITTALS

- A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.
- B. LEED Submittals:
 - 1. Air-Balance Report for Prerequisite IEQ 1: Documentation of work performed for ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
 - 2. TAB Report for Prerequisite EA 2: Documentation of work performed for ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.06 INFORMATIONAL SUBMITTALS

- A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.
- B. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
 - 1. Provide list of similar projects completed by proposed TAB field supervisor.
 - 2. Provide copy of completed TAB report, approved by mechanical engineer of record for a completed project with similar system types and of similar complexity.
- C. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
 - 1. Submit examinations report with qualifications data.
- D. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- E. Interim Reports. Submit interim reports as specified in Part 3. Include list of system conditions requiring correction and problems not identified in Contract Documents examination report.
- F. Certified TAB reports.
 - 1. Provide three printed copies of final TAB report. Provide one electronic file copy in PDF format.
- G. Sample report forms.
- H. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.

2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.
 - a. Instruments to be used for testing and balancing shall have been calibrated within a period of one year, or less if so recommended by instrument manufacturer and be checked for accuracy prior to start of work.

1.07 CLOSEOUT SUBMITTALS

- A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.
- B. Certified TAB reports, for inclusion in Operation and Maintenance Manual.

1.08 QUALITY ASSURANCE

- A. Independent TAB Specialist Qualifications: Engage a TAB entity certified by AABC or NEBB.
 1. The certification shall be maintained for the entire duration of TAB work for this Project. If TAB specialist loses certification during this period, the Contractor shall immediately notify the Architect and submit another TAB specialist for approval. All work specified in this Section and in other related Sections performed by the TAB specialist shall be invalidated if the TAB specialist loses certification, and shall be performed by an approved successor.
- B. To secure approval for the proposed TAB specialist, submit information certifying that the TAB specialist is either a first tier subcontractor engaged and paid by the Contractor, or is engaged and paid directly by the Owner. TAB specialist shall not be affiliated with any other entity participating in Work of this Contract, including design, furnishing equipment, or construction. In addition, submit evidence of the following:
 1. TAB Field Supervisor: Full-time employee of the TAB specialist and certified by AABC or NEBB.
 - a. TAB field supervisor shall have minimum 10 years supervisory experience in TAB work.
 2. TAB Technician: Full-time employee of the TAB specialist and who is certified by AABC or NEBB as a TAB technician.
 - a. TAB technician shall have minimum 4 years TAB field experience.
- C. TAB Specialist engaged to perform TAB work in this Project shall be a business limited to and specializing in TAB work, or in TAB work and Commissioning.
- D. TAB specialist engaged to perform TAB work shall not also perform commissioning activities on this Project.
- E. Certified TAB field supervisor or certified TAB technician shall be present at the Project site at all times when TAB work is performed.

1. TAB specialist shall maintain at the Project site a minimum ratio of one certified field supervisor or technician for each non-certified employee at times when TAB work is being performed.
- F. Contractor shall notify Architect in writing within three days of receiving direction resulting in reduction of test and balance scope or other deviations from Contract Documents. Deviations from the TAB plan shall be approved in writing by the mechanical engineer of record for the Project.
- G. TAB Standard:
1. Perform TAB work in accordance with the requirements of the standard under which the TAB agencies' qualifications are approved unless Specifications contain different or more stringent requirements:
 - a. AABC National Standards for Total System Balance, or
 - b. NEBB Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
 2. All recommendations and suggested practices contained in the TAB standard are mandatory. Use provisions of the TAB standard, including checklists and report forms, to the extent to which they are applicable to this Project.
 3. Testing, adjusting, balancing procedures, and reporting required for this Project, and not covered by the TAB standard applicable to the TAB specialist engaged to perform the Work of this Contract, shall be submitted for approval by the design engineer.
- H. TAB Conference: Meet with Architect and mechanical engineer on approval of the TAB strategies and procedures plan to develop a mutual understanding of the project requirements. Require the participation of the TAB field supervisor. Provide seven days' advance notice of scheduled meeting time and location. TAB conference shall take place at location selected by Architect offices of Capital.
1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow, including protocol for resolution tracking and documentation.
 2. The requirement for TAB conference may be waived at the discretion of the mechanical engineer of record for the Project.
- I. Certify TAB field data reports and perform the following:
1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

- J. TAB Report Forms: Use standard TAB specialist's forms approved by Architect.
- K. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."
- L. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- M. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.09 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.10 WARRANTY

- A. Provide workmanship and performance warranty applicable to TAB specialist engaged to perform Work of this Contract:
 - 1. AABC Performance Guarantee.
 - 2. NEBB Quality Assurance Program.
- B. Refer to Division 01 Specifications for additional requirements.

1.11 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.
- C. Coordinate TAB work with work of other trades.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contract Documents Examination Report:
 - 1. TAB specialist shall review Contract Documents, including plans and specifications. Provide report listing conditions that would prevent the system(s) from operating in accordance with the sequence of operations specified, or would prevent accurate testing and balancing:
 - a. Identify each condition requiring correction using equipment designation shown on Drawings. Provide room number, nearest building grid line intersection, or other information necessary to identify location of condition requiring correction.
 - b. Proposed corrective action necessary for proper system operation.

- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- J. Examine operating safety interlocks and controls on HVAC equipment.
- K. Report conditions requiring correction discovered before and during performance of TAB procedures.
- L. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.02 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures. TAB plan shall be specific to Project and include the following:
 - 1. General description of each air system and sequence(s) of operation.
 - 2. Complete list of measurements to be performed.
 - 3. Complete list of measurement procedures. Specify types of instruments to be utilized and method of instrument application.
 - 4. Qualifications of personnel assigned to Project.
 - 5. Single-line CAD drawings reflecting all test locations (terminal units, grilles, diffusers, traverse locations, etc).
 - 6. Table indicating pressure relationships (positive, negative, or neutral) between building spaces.
 - 7. Air terminal correction factors for the following:

- a. Air terminal configuration.
 - b. Flow direction (supply or return/exhaust).
 - c. Effective area of each size and type of air terminal.
 - d. Air density.
- B. Complete system-readiness checks and prepare reports. Verify the following:
- 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, smoke, and fire dampers are open.
 - 5. Isolating and balancing valves are open and control valves are operational.
 - 6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.
 - 1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 23 07 13 "Duct Insulation," Section 23 07 16 "HVAC Equipment Insulation," Section 23 80 00 Heating, Ventilating, and Air Conditioning."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.04 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Test each system to verify building or space operating pressure, including all stages of economizer cycle. Maximum building pressure shall not exceed 0.03 inches of pressure.
- C. Except as specifically indicated in this Specification, Pitot tube traverses shall be made of each duct to measure airflow. Pitot tubes, associated instruments, traverses, and techniques shall conform to ASHRAE Handbook, HVAC Applications, and ASHRAE Handbook, HVAC Systems and Equipment.
 - 1. Use state-of-the-art instrumentation approved by TAB specialists governing agency..
 - 2. Where ducts' design velocity and air quantity are both less than 1000 fpm/CFM, air quantity may be determined by measurements at terminals served.
- D. Test holes shall be placed in straight duct, as far as possible downstream from elbow, bends, take-offs, and other turbulence-generating devices.
- E. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- F. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- G. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- H. Verify that motor starters are equipped with properly sized thermal protection.
- I. Check dampers for proper position to achieve desired airflow path.
- J. Check for airflow blockages.
- K. Check condensate drains for proper connections and functioning.
- L. Check for proper sealing of air-handling-unit components.
- M. Verify that air duct system is sealed as specified in Section 23 31 13 "Metal Ducts." Section 23 80 00 "Heating, Ventilating, and Air Conditioning."
- N. Provide for adjustments or modifications to fan and motor sheaves, belts, damper linkages, and other components as required to achieve specified air balance at no additional cost to Owner.
- O. Automatically operated dampers shall be adjusted to operate as indicated in Contract Documents. Controls shall be checked for proper calibration.

3.05 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.

- a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow. Alternative methods shall be examined for determining total CFM, i.e., Pitot-tube traversing of branch ducts, coil or filter velocity profiles, prior to utilizing airflow values at terminal outlets and inlets.
2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 6. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Check operation of relief air dampers. Measure total relief air quantity at each stage of normal, economizer, power exhaust, or power exhaust economizer operation, as applicable to installed equipment. Adjust relief air dampers to provide 100 percent relief in economizer mode. Ensure that relief dampers close completely upon unit shutdown.
 - C. Check operation of outside air dampers. Measure total outside air quantity at each stage of normal, economizer, power exhaust, or power exhaust economizer operation, as applicable to installed equipment. Adjust outside air dampers to provide 100 percent outside air in economizer mode. Ensure that outside air dampers close completely upon unit shutdown.
 - D. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- E. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading digital backflow compensating hood. Use outlet manufacturer's written instructions and calculating factors only when direct-reading hood cannot be used due to physical obstruction or other limiting factors. Final report shall indicate where values listed have not been obtained by direct measurement.
- F. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents, if included.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts. Terminal air velocity at five feet above finished floor shall not exceed 50 feet per minute in occupied air conditioned spaces.
- G. Do not overpressurize ducts.

3.06 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer's name, model number, and serial number.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter manufacturer's name, model number, size, type, and thermal-protection-element rating.
 - a. Starter strip heater size, type, and rating.

- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.07 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
 - 1. Measure and record the operating speed, airflow, and static pressure of each fan.
 - 2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
 - 3. Check the condition of filters.
 - 4. Check the condition of coils.
 - 5. Check the operation of the drain pan and condensate-drain trap.
 - 6. Check bearings and other lubricated parts for proper lubrication.
 - 7. Report on the operating condition of the equipment and the results of the measurements taken. Report conditions requiring correction.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
 - 1. New filters are installed.
 - 2. Coils are clean and fins combed.
 - 3. Drain pans are clean.
 - 4. Fans are clean.
 - 5. Bearings and other parts are properly lubricated.
 - 6. Conditions requiring correction noted in the preconstruction report are corrected.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
 - 1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
 - 2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
 - 3. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
 - 4. Balance each air outlet.

3.08 GENERAL PROCEDURES FOR PLUMBING SYSTEMS

- A. Measure pressure drop across each backflow preventer assembly at design flows.
- B. Measure water flow at pumps. Use the following procedures except for positive-displacement pumps:
 - 1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
 - a. If impeller sizes must be adjusted to achieve pump performance, obtain approval from Architect Owner Construction Manager Commissioning Authority and comply with requirements in Section 22 50 00 "Plumbing Equipment Section 22 11 23 "Domestic Water Pumps."
 - 2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.
 - a. Monitor motor performance during procedures and do not operate motors in overload conditions.
 - 3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
 - 4. Report flow rates that are not within range given in article, Tolerances.
- C. Set calibrated balancing valves, if installed, at calculated presettings.
- D. Measure flow at all stations and adjust, where necessary, to obtain first balance.
 - 1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.
- E. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.
- F. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
 - 1. Determine the balancing station with the highest percentage over indicated flow.
 - 2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
 - 3. Record settings and mark balancing devices.
- G. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.
- H. Measure the differential-pressure-control-valve settings existing at the conclusion of balancing.

- I. Check settings and operation of each safety valve. Record settings.

3.09 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 10 percent and minus 0 percent.
 2. Air Outlets and Inlets: Plus 5 percent and minus 5 percent.
 3. Multiple outlets within single room: Plus 5 percent and minus 0 percent for total airflow within room. Tolerance for individual outlets within a single room having multiple outlets shall be as for "Air Outlets and Inlets."
- B. Set plumbing systems water flow rates within plus or minus 10 percent.

3.10 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Interim Reports: Prepare periodic lists of conditions requiring correction and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.11 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing field supervisor. Report shall be co-signed by the Contractor, attesting that he has reviewed the report, and the report has been found to be complete and accurate.
 2. The certification sheet shall be followed by sheet(s) listing items for which balancing objectives could not be achieved. Provide explanation for failure to achieve balancing objectives for each item listed.
 3. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 1. Pump curves.
 2. Fan curves.
 3. Manufacturers' test data.
 4. Field test reports prepared by system and equipment installers.

5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB specialist.
 3. Project name.
 4. Project location.
 5. Project Performance Guaranty
 6. Architect's name and address.
 7. Engineer's name and address.
 8. Contractor's name and address.
 9. Report date.
 10. Signature of TAB supervisor who certifies the report.
 11. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 12. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 13. Nomenclature sheets for each item of equipment.
 14. Data for terminal units, including manufacturer's name, type, size, and fittings.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.

- h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
- 1. Quantities of outdoor, supply, return, and exhaust airflows.
 - 2. Duct, outlet, and inlet sizes.
 - 3. Pipe and valve sizes and locations.
 - 4. Terminal units.
 - 5. Balancing stations.
 - 6. Position of balancing devices.
- E. Air distribution outlets and inlets shall be shown on keyed plans with designation for each outlet and inlet matching designation used in Contract Documents and TAB test reports. Room numbers shall be included in keyed plans and test reports. Where multiple outlets and inlets are installed within a single room, a designation shall be assigned and listed for each outlet and inlet in addition to room number.
- F. Test Reports – General:
- 1. All test reports containing air or liquid flow data shall record flow values prior to system adjustment in addition to required data listed for each test report.
- G. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
- 1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.

- b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
3. Test Data (Indicated and Actual Values):
- a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Preheat-coil static-pressure differential in inches wg.
 - g. Cooling-coil static-pressure differential in inches wg.
 - h. Heating-coil static-pressure differential in inches wg.
 - i. Outdoor airflow in cfm.
 - j. Return airflow in cfm.
 - k. Relief airflow in cfm.
 - l. Outdoor-air damper position, normal and economizer, power exhaust, or power exhaust economizer modes, as applicable to installed equipment.
 - m. Return-air damper position.
 - n. Relief-air damper position, normal and economizer, power exhaust, or power exhaust economizer modes, as applicable to installed equipment.
 - o. Vortex damper position.

H. Apparatus-Coil Test Reports:

1. Coil Data:
- a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.

- f. Make and model number.
 - g. Face area in sq. ft.
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Refrigerant expansion valve and refrigerant types.
 - i. Inlet steam pressure in psig.
- I. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:
 1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Coil identification.
 - d. Capacity in Btu/h.
 - e. Number of stages.
 - f. Connected volts, phase, and hertz.
 - g. Rated amperage.
 - h. Air flow rate in cfm.
 - i. Face area in sq. ft.
 - j. Minimum face velocity in fpm.
 2. Test Data (Indicated and Actual Values):

- a. Heat output in Btu/h.
 - b. Air flow rate in cfm.
 - c. Air velocity in fpm.
 - d. Entering-air temperature in deg F.
 - e. Leaving-air temperature in deg F.
 - f. Voltage at each connection.
 - g. Amperage for each phase.
- J. Fan Test Reports: For supply, return, and exhaust fans, include the following:
1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.

- d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- K. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
- 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft.
 - g. Indicated air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- L. Air-Terminal-Device Reports:
- 1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.
 - d. Area served.
 - e. Make.
 - f. Number from system diagram.
 - g. Type and model number.
 - h. Size.
 - i. Effective area in sq. ft.
 - 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.

- b. Air velocity in fpm.
 - c. Preliminary air flow rate as needed in cfm.
 - d. Preliminary velocity as needed in fpm.
 - e. Final air flow rate in cfm.
 - f. Final velocity in fpm.
 - g. Space temperature in deg F.
- M. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:
- 1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Service.
 - d. Make and size.
 - e. Model number and serial number.
 - f. Water flow rate in gpm.
 - g. Water pressure differential in feet of head or psig.
 - h. Required net positive suction head in feet of head or psig.
 - i. Pump rpm.
 - j. Impeller diameter in inches.
 - k. Motor make and frame size.
 - l. Motor horsepower and rpm.
 - m. Voltage at each connection.
 - n. Amperage for each phase.
 - o. Full-load amperage and service factor.
 - p. Seal type.
 - 2. Test Data (Indicated and Actual Values):
 - a. Static head in feet of head or psig.
 - b. Pump shutoff pressure in feet of head or psig.
 - c. Actual impeller size in inches.

- d. Full-open flow rate in gpm.
- e. Full-open pressure in feet of head or psig.
- f. Final discharge pressure in feet of head or psig.
- g. Final suction pressure in feet of head or psig.
- h. Final total pressure in feet of head or psig.
- i. Final water flow rate in gpm.
- j. Voltage at each connection.
- k. Amperage for each phase.

N. Instrument Calibration Reports:

- 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.12 INSPECTIONS

A. Initial Inspection:

- 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
- 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 5 percent of terminals.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Verify that balancing devices are marked with final balance position.
 - e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

- 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect.

2. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Architect.
 3. Architect shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than 10 percent, the measurements shall be noted as "FAILED."
 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 2. If the second final inspection also fails, Owner may contact the TAB specialists' governing organization for remedial action by the governing organization under the workmanship and performance warranty. See article, Warranty.
 3. If remedial action is not provided by the TAB specialists' governing organization in a timely manner, Owner may contract the services of another TAB specialist to complete the TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB specialists' final payment.
- D. Prepare test and inspection reports.

3.13 ADDITIONAL TESTS

- A. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

SECTION 23 08 00.13 - TITLE 24 COMMISSIONING OF HVAC**PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes: Requirements for commissioning of HVAC systems for Title 24 (T-24) compliance.
- B. Scope: Commissioning Coordinator shall complete the building systems commissioning requirements of the California Energy Code, as applicable to Project. It is not the intention of Project specifications to require duplication in testing.
 - 1. T-24 commissioning activities may be coordinated with Contractor tests and TAB work specified in technical Sections.
 - 2. T-24 commissioning activities may be coordinated with LEED and CHPS program commissioning activities, as applicable to Project.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The requirements of this Section apply to all Sections of Division 23.
- C. In the event of conflict between requirements of Division 01 Title 24 commissioning specifications and this Section, Division 01 requirements shall prevail.

1.03 REFERENCES

- A. 2016 California Energy Code.
- B. 2016 California Energy Code and Building Energy Efficiency Standards Reference Appendices.
- C. 2016 Building Energy Efficiency Standards Nonresidential Compliance Manual.

1.04 DEFINITIONS

- A. Commissioning Coordinator: General Contractor, or an entity engaged by the General Contractor to perform T-24 commissioning.
- B. Covered Processes: Process equipment for which there are listed requirements in the California Energy Code.
- C. OPR: Owner's Project Requirements.
- D. TAB: Testing, Adjusting, and Balancing.

1.05 SUBMITTALS (FOR RECORD ONLY)

- A. Submit the following:
 - 1. Commissioning Plan.
 - 2. Systems Manual.

3. Commissioning Report.
4. Certificates of Installation.
5. Certificates of Acceptance.

B. Above items for inclusion in closeout documents submitted to authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 TEST INSTRUMENTS

- A. Commissioning Coordinator shall supply test instruments. Instruments to be used for testing and balancing shall have been calibrated within a period of one year, or less if recommended by instrument manufacturer, and be checked for accuracy prior to start of work.

PART 3 - EXECUTION

3.01 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

- A. Architect/Engineer:
1. Performs construction observation. Provides construction observation reports.
 2. Reviews and approves Commissioning Plan, Systems Manual, and Commissioning Report.
 3. Assists in problem resolution.
- B. Commissioning Coordinator:
1. Coordinates commissioning process.
 2. Develops Commissioning Plan.
 3. Schedules and conducts functional testing. Completes Certificates of Acceptance.
 4. Assembles Systems Manual.
 5. Schedules and conducts systems operations training. Verifies systems operations training completion.
- C. HVAC Subcontractor: Assists in functional testing.
- D. Electrical Subcontractor: Assists in functional testing.
- E. Controls Subcontractor: Assists in functional testing.
- F. TAB Subcontractor: Assists in functional testing.
- G. Equipment Manufacturers/Vendors:
1. Performs Check, Test, and Start of equipment and systems, as required by Project technical Sections.

2. Provides systems and equipment documentation required to complete functional testing and assemble Systems Manual.

3.02 COMMISSIONING PLAN

- A. Commissioning Coordinator shall author the code-required Commissioning Plan. The Commissioning Plan shall address HVAC systems for which commissioning is required. The Commissioning Plan shall be updated by Commissioning Coordinator throughout the construction process. The Commissioning Plan shall contain the following:
 1. General Project Information: Commissioning Coordinator shall obtain general Project information from Project architectural Drawings.
 2. Commissioning Goals:
 - a. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.
 - b. Verify and document proper integrated performance of equipment and systems utilizing functional testing for mechanical system acceptance, as required by the California Energy Code.
 - c. Verify that Systems Manual documentation is complete.
 - d. Verify that operating personnel are trained to enable them to operate, monitor, adjust, and maintain HVAC systems in an effective and energy-efficient manner.
 3. Commissioning Coordinator shall compile the following information and include in Commissioning Plan:
 - a. An explanation of original design intent: Commissioning Coordinator shall obtain copies of the OPR and BOD for the Project.
 - b. Equipment and systems to be tested, including the extent of tests: Test 100 percent of a given type of installed equipment having associated Acceptance Requirements.
 - 1) Refer to forms MCH-01-E on Drawings for systems to be commissioned.
 - 2) Covered Processes: In addition to systems listed in MCH-01-E on Drawings, complete Acceptance Requirements for the following systems, if applicable to Project:
 - a) Parking garage ventilation systems.
 - b) Compressed air systems.
 - c) Type 1 Kitchen exhaust systems.
 - c. Functions to be tested: Refer to 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Nonresidential Appendix NA7.
 - d. Conditions under which the test shall be performed.

- e. Measureable criteria for acceptable performance: Refer to 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Nonresidential Appendix NA7.
- f. Commissioning team information:
 - 1) Refer to Project information on architectural Drawings for design team participants. Commissioning Coordinator shall add subcontractor information to provided design team information and include in Commissioning Plan.
- g. Commissioning process activities, schedules, and responsibilities. Plans for the completion of functional performance testing, systems operations training, and commissioning report.

3.03 CERTIFICATES OF INSTALLATION

- A. Commissioning Coordinator shall complete applicable Certificates of Installation forms.

3.04 FUNCTIONAL TESTING REQUIREMENTS

- A. Contractor shall complete the applicable Acceptance Requirements for Code Compliance contained in the California Building Energy Efficiency Standards. Refer to T-24 compliance forms on Drawings for systems having Acceptance testing requirements. Contractor shall perform Acceptance tests and complete the appropriate "Certificates of Acceptance." Contractor shall engage certified HERS Rater to verify duct leakage rate for duct systems indicated on T-24 compliance forms on Drawings as requiring duct leakage rate testing. For additional duct leak testing requirements, refer to Section 23 80 00, "Heating, Ventilating, and Air Conditioning," Article, "Ductwork Sealing and Leak Testing."
- 1. Covered Processes: In addition to systems listed on T-24 compliance forms on Drawings, complete Acceptance Requirements for the following systems, if applicable to Project:
 - a. Parking garage ventilation systems.
 - b. Compressed air systems.
 - c. Type 1 Kitchen exhaust systems.

3.05 SYSTEMS MANUAL

- A. Commissioning Coordinator shall assemble Systems Manual in accordance with the requirements of the California Energy Code, HVAC and Plumbing specifications, and Division 01 specifications, including Section 01 79 00, Demonstration and Training, and commissioning specifications.

3.06 SYSTEMS OPERATIONS TRAINING

- A. Commissioning Coordinator shall provide systems operations training in accordance with the requirements of the California Energy Code, HVAC and Plumbing specifications, and Division 01 specifications, including Section 01 79 00, Demonstration and Training, and commissioning specifications.

3.07 COMMISSIONING REPORT

- A. Commissioning Coordinator shall complete Commissioning Report in accordance with the requirements of the California Energy Code and Division 01 commissioning specifications.

END OF SECTION

SECTION 23 80 00 - HEATING, VENTILATING AND AIR CONDITIONING**PART 1 - GENERAL****1.01 SUMMARY**

A. Section Includes:

1. Fans.
2. Louvers.
3. Air inlets and outlets.
4. Filters.
5. Dampers.
6. Ductwork.
7. Insulation.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 23 00 50, Basic HVAC Materials and Methods.
- C. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.
- D. Section 23 09 23, Direct Digital Control (DDC) System for HVAC.

1.03 ACTION SUBMITTALS

- A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.
- B. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, dimensions, weight, corner or mounting point weights, furnished specialties and accessories; and installation and start-up instructions. Product data shall include applicable product listings and standards. Refer to Section 23 00 50, Basic HVAC Material and Methods for additional requirements.
- C. Engineering Data: Submit fan curves and sound power level data for each fan unit. Data shall be at the scheduled capacity. Data shall include the name of the rating agency or independent laboratory.

1.04 INFORMATIONAL SUBMITTALS

- A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.
- B. Economizer Fault Detection and Diagnostics (FDD) System Data: For all air-cooled unitary direct-expansion units equipped with an economizer, provide data for third-party supplied California Energy Commission certified FDD controller, documenting compliance with the requirements of California Building Energy Efficiency Standards. Provide evidence of certification.

- C. Record of pre-installation meeting.
- D. Coordinated Layouts: Submit coordinated layouts. For requirements refer to article, Coordinated Layouts, in this Section.

1.05 CLOSEOUT SUBMITTALS

- A. For additional requirements, refer to Section 23 00 50, Basic HVAC Materials and Methods.
- B. Maintenance Data: Submit maintenance data and parts list for each piece of equipment, control, and accessory; including "trouble-shooting guide," in Operation and Maintenance Manual.
- C. Record Drawings: Submit Record Drawings of installed ductwork, duct accessories, and outlets and inlets in accordance with requirements of Division 01.

1.06 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. Belts: One set(s) for each belt-driven unit.
 - 2. Provide one complete set(s) of filters for each filter bank.

1.07 COORDINATED LAYOUT

- A. Coordinated layouts are required to amplify, expand and coordinate the information contained in the Contract Documents.
- B. Provide minimum 1/4 inch equals one foot scaled coordinated layout drawings showing plan and pertinent section or elevation views of piping, ductwork, equipment, accessories, and electrical systems. Drawings shall be reproducible and work of each trade represented shall be fully coordinated with structure, other disciplines, and finished surfaces. Drawings shall be presented on a single size sheet. Coordinated layout drawings shall have title block, key plan, north arrow and sufficient grid lines to provide cross-reference to design Drawings.
 - 1. Provide a stamp or title block on each drawing with locations for signatures from all contractors involved, including but not limited to the General, HVAC, Plumbing, Fire Protection, and Electrical contractors. Include statement for signature that the contractor has reviewed the coordinated layout drawings in detail and has coordinated the work of his trade.
 - 2. Show on drawings the intended elevation of all ductwork in accordance with the following example:
 - a. B.O.D. = 9'-0"
OFFSET UP 6"
B.O.D. = 9'-6"
 - 3. Highlight, encircle or otherwise indicate deviations from the Contract Documents on the coordinated layouts. Architect will not be responsible for identifying deviations from the original Contract Documents.
- C. Since scale of contract drawings is small and all offsets and fittings are not shown, Contractor shall make allowances in bid for additional coordination time, detailing, fittings,

offsets, hangers and the like to achieve a fully coordinated installation. If changes in duct size are required, equivalent area shall be maintained and the aspect ratio shall not be in excess of 2 to 1 unless approved by the engineer. Drawings shall be submitted for review prior to fabrication and installation. Drawings may be submitted in packages representing at least one quarter of the building ductwork.

- D. Check routing on all ductwork before fabricating. Report any discrepancies to Architect. No extra cost will be allowed for failure to conform to above.

1.08 QUALITY ASSURANCE

A. Design Criteria:

1. All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture. All gas-fired equipment shall be UL, ETL or CSA listed.
2. Supply all equipment and accessories in accordance with requirements of applicable national, state and local codes.
3. All items of a given type shall be products of the same manufacturer.
4. Scheduled equipment performance is minimum capacity required.
5. Scheduled electrical capacity shall be considered as maximum available.
6. Scheduled gas BTU input shall be considered as maximum available.

B. Variable Refrigerant Flow Split-System Heat Pump Installer Training: Installing contractor shall have completed training in installation and service of VRF system, by equipment manufacturer.

1. Installing contractor shall obtain, at his own cost, equipment manufacturer's VRF system service tool, unless service tool is normally resident on controller specified for this Project.

1.09 FIELD CONDITIONS

A. Interruption of Existing Services: Do not interrupt services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of services.
2. Do not interrupt services without Architect's written permission.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.02 FANS

- A. All fans shall be Air Moving and Control Association Inc. (AMCA) labeled.

- B. Provide self-aligning, enclosed ball bearings, accessible for lubrication unless specified otherwise.
- C. Provide variable speed switch for all direct drive fans.
- D. Roof Mounted:
 - 1. Direct or V-belt Drive: Provide one-piece heavy-duty ventilator housings, one piece heavy gauge spun aluminum construction, with weatherproof assembly and integral weather shield. Mount ventilators on curbs furnished by the fan manufacturer. Install with fan assembly level.
 - 2. Fan wheels shall be centrifugal design, statically and dynamically balanced. Tip speed, rpm and motor horsepower shall not exceed listing in manufacturer's catalog for unit specified.
 - 3. Fans shall have integral factory formed base and one piece spinning without welding. Housings shall be provided with wiring channel and are to be of the direct discharge design. Motor and fan assembly shall be on vibration isolating mounts. Fans shall have capacity, speeds and motor sizes as shown.
 - 4. Provide the following accessories:
 - a. Gravity backdraft dampers.
 - b. Aluminum bird screen with a minimum of 85 percent free area.
 - c. Adjustable motor pulley.
- E. In-Line Propeller Fans:
 - 1. Heavy-duty propeller type with belt or direct drive as specified. Blades shall be individually mounted to wheel.
 - 2. Provide sloped roof or flat roof type roof cap, or wall cap to suit the location indicated on the Drawings.
- F. In-Line Centrifugal Fans:
 - 1. Centrifugal fan with airfoil blades, aluminum or steel housing, externally mounted belt-drive motor, external lube tubes, integral support brackets.
 - 2. Provide sloped roof or flat roof type roof cap, or wall cap to suit the location indicated on the Drawings.
- G. Fan Drives:
 - 1. Drive Design: The design horsepower rating of each drive shall be at least 1.5 times, single belt drives 2 times, the nameplate rating of the motor with proper allowances for sheave diameters, speed ratio, arcs of contact and belt length.
 - 2. Provide variable speed drives, Dayco, Browning, Woods, or equal. Allow for replacement of fan and motor drives and belts as required to suit the balance requirements of the project.

3. Select variable speed drives to allow an increase or decrease of minimum of ten percent of design fan speed.
- H. Motors:
1. Motors of 25 HP and less shall have adjustable pitch sheaves; sheaves on motors above 25 HP may be non-adjustable. Change, at no extra cost to Owner, the non-adjustable sheaves to obtain desired air quantities.
 2. For single-phase fan motors sized larger than 1/12 hp and smaller than 1 hp, refer to Article, Electric Motors, in Section 23 00 50, Basic HVAC Materials and Methods.
- I. Sheaves: Sheaves shall be cast or fabricated, bored to size or bushed with fully split tapered bushings to fit properly on the shafts. All sheaves shall be secured with keys and set screws.
- J. Belts:
1. All belts shall be furnished in matched sets.
 2. Belts shall be within 1 degree 30 minutes of true alignment in all cases.
- K. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Greenheck Fan Corporation.
 2. Loren Cook Company.
 3. PennBarry.
 4. American Coolair Corporation.
- L. Owner Training: Manufacturer shall provide one on-site 1-hour training session for Owners' maintenance personnel.

2.03 LOUVERS

- A. Louvers shall be minimum 16 gauge steel with Bonderite and Epon gray primer and 1/2 inch square mesh, 16 gauge galvanized steel screen on the inside. Louvers shall be Airlite #609, Arrow United Industries, or equal, with 4 inch louver depth.

2.04 AIR INLETS AND OUTLETS

- A. Except as otherwise indicated, provide manufacturer's standard inlets and outlets where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Ceiling, wall or floor Compatibility: Provide inlets and outlets with border styles that are compatible with adjacent ceiling, wall or floor systems, and that are specifically manufactured to fit into ceiling, wall or floor module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems that will contain each type of air outlet and inlet.
- C. Refer to Schedule on Mechanical Drawings for details of inlets and outlets to be used.

2.05 AIR FILTERS

- A. Provide MERV 13 disposable pleated media type. Refer to specific equipment Articles for filter depth and for exceptions to this specification. Filters shall conform to the following:
1. Standards:
 - a. ASHRAE Standard 52.2-2007.
 - b. Underwriters Laboratories: U.L. 900, Class 2.
 2. Construction:
 - a. Media: Synthetic or cotton-synthetic blend with radial pleats.
 - b. Media Frame: High wet-strength beverage board.
 - c. Media Support: Welded wire or expanded metal grid bonded to air leaving side of the media.
 3. Performance: 2" deep filter shall have a maximum initial air resistance of 0.31 inches w.g.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Camfil Farr, Inc., model 30/30.
 2. Flanders Corporation, model 40 LPD.
- C. Temporary (Construction Period) Filters:
1. Install new temporary filters in all units that have filter systems installed. Temporary filters shall match the permanent filters that are specified for the units. Replace filters as needed, in accordance with manufacturer's directions, in order to provide protection for the unit prior to occupancy by the Owner.
 2. If air handling units are operated during construction of the project, install temporary filters directly over each return air inlet. Filters shall match the permanent filters that are specified for the units. Select size of filter to completely cover the frame of the return air inlet, and tape filters firmly in place to eliminate any construction debris from entering the duct system or unit. Remove the temporary filters upon completion of the work, and repair all damaged paintwork.
- D. Spare Filters:
1. Furnish two new, complete sets of filter cartridges for each filter bank on completion and acceptance of the work. Install one set of filters in units (prior to final air balance). Provide units designed to accommodate washable, permanent filters with one washable, permanent filter.

2.06 DAMPERS

- A. Backdraft Dampers: Ruskin CBD2, counterbalanced, Nailer Industries, or equal.

- B. Manual Air and Balance Dampers: Provide dampers of single blade type or multi-blade type constructed in accordance with SMACNA, "HVAC Duct Construction Standards," except as noted herein.
1. Rectangular Ductwork:
 - a. Single damper blades may be used in ducts up to 10 inches in height. Dampers shall be 16 gauge minimum. Provide self-locking regulators, equal to Ventlok 641. Provide end bearings equal to Ventlok 607 at each damper. Provide continuous solid 3/8 inch square shafts.
 - b. Multiple blade dampers shall be equal to Ruskin CD35 Standard Control Damper. Maximum width for multiple damper blades for use in rectangular duct shall not exceed 6 inches.
 - c. Where duct velocity may be expected to exceed 1500 fpm, provide Ruskin CD-50, or equal, low leakage dampers with airfoil blades.
 2. Round Ductwork:
 - a. Single damper blades may be used in ducts up to 12 inches in diameter. Provide multiple blade opposed blade dampers, with connected linkage, for ductwork larger than 12 inches in diameter.
 - b. Damper blades for round ductwork shall be 20 gauge steel for ducts up to 12 inches diameter and 16 gauge steel for dampers larger than 12 inches damper. Provide self-locking regulators, equal to Ventlok 641, Durodyne, or equal for operation of dampers. Provide end bearings equal to Ventlok 607 and provide continuous solid 3/8 inch square shafts.
 3. Where ductwork is externally insulated, provide self-locking regulators equal to Ventlok 644, Durodyne, or equal for rectangular ductwork, and Ventlok 637, Durodyne, or equal for round ducts.
- C. Where required to suit the size of damper required, provide manufacturers standard UL Classified mullions, arranged to support multiple dampers. Assembly shall be of minimum 16 gauge galvanized steel, complete with all accessory caps and framing members required for installation.

2.07 DUCTWORK

- A. Construct and install sheet metal ductwork in accordance with the California Mechanical Code for 2 inches static pressure for supply air, and 2 inches minimum for return and exhaust air unless otherwise noted on Drawings.
1. Where not in conflict with the California Mechanical Code, construct and install all sheet metal ductwork in accordance with SMACNA HVAC Duct Construction Standards (Metal and Flexible). Where applicable for HVAC work, construct and install sheet metal work in accordance with SMACNA Architectural Sheet Metal Manual.
 2. Provide variations in duct size, and additional duct fittings as required to clear obstructions and maintain clearances as approved by the Architect at no extra cost to the Owner.
 3. Gauges, joints and bracing shall be in accordance with the California Mechanical Code.

4. Provide beading or cross breaking for all ductwork inside building. Provide cross breaking for ductwork exposed to weather.
 5. At the contractor's option, ductwork may be fabricated using the Ductmate, Nexus, Quickduct, Transverse Duct Connection (TDC), Pyramid-Loc duct connection systems, or equal. Fabricate in strict conformance with manufacturer's written installation instructions and in accordance with California Mechanical Code.
 - a. Seal flanged ends with pressure sensitive high density, closed cell neoprene or polyethylene tape gasket, Thermo 440, or equal.
 - b. Provide metal clips for duct connections, except at breakaway connections for fire dampers and fire smoke dampers. Provide corner clips at each corner of duct, through bolted, at all locations except at breakaway connections for fire dampers and fire smoke dampers. Where used on locations exposed to weather, provide continuous metal clip at top and sides of duct, with 1 inch overhang for top side.
- B. Design and installation standards:
1. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) for all work in this section.
 2. NFPA Compliance: Comply with ANSI/NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," and ANSI/NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems."
 3. California Mechanical Code.
- C. Duct sizes indicated are external sizes.
- D. Galvanized Sheet Steel: Lock-forming quality, ASTM A924 and ASTM A653, Coating Designation G 90. Provide mill phosphatized finish for exposed surfaces of ducts exposed to view.
1. Provide mill certification for galvanized material at request of the Project Inspector.
- E. Duct Sealants:
1. Sealant shall have a VOC content of 250 g/L or less.
 2. Sealant shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.
 3. Provide one part, non-sag, synthetic latex sealant, formulated with a minimum of 68 percent solids. Sealant shall comply with ASTM E84, Surface Burning Characteristics.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - 1) Design Polymerics, model DP1010.
 - 2) Polymer Adhesive Sealant Systems Inc, model Airseal #11.
 - 3) McGill Airseal, LLC.

F. Duct Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, straps, trim, and angles for support of ductwork.

G. Rectangular Duct Fabrication:

1. Shop fabricate ductwork of gauges and reinforcement complying with the more stringent of the following standards, except as noted herein.
 - a. SMACNA HVAC Duct Construction Standards
 - b. California Mechanical Code
2. Fabricate ducts for 2 inch pressure class with minimum duct gauges and reinforcement as follows, except as otherwise noted:

<u>Table A</u>		
<u>Duct Dimension</u>	<u>Minimum Gauge</u>	<u>Joint Reinforcement Per CMC</u>
Through 12"	26	Not Required
13" through 18"	24	Not Required
19" through 30"	24	C/4
31" through 42"	22	E/4
43" through 54"	22	F/2
55" through 60"	20	G/4
61" through 84"	20	I/2
85" through 96"	20	J/2
Over 96"	18	K/2

3. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1.5 times associated duct width. Fabricate to include single thickness turning vane in elbows where space does not permit the above radius or where square elbows are shown. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers. Turning vanes shall be E-Z Rail II, Durodyne, or equal.
4. Fabricate round supply connections at rectangular, plenum type fittings using spin-in type fittings, complete with extractor and volume control damper. Refer to Paragraph "DAMPERS" for damper requirements.

5. Provide drive slip or equivalent flat seams for ducts exposed in the conditioned space or where necessary due to space limitations. On ducts with flat seams, provide standard reinforcing on inside of duct. Duct connection to outlet on exposed duct shall be full size of outer perimeter of outlet flange.
 6. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
 7. Provide 20 gauge minimum for ductwork exposed within occupied spaces.
- H. Rectangular Internally Insulated Duct Fabrication:
1. Provide internal duct lining where indicated on the Drawings, with a minimum of 10'-0" length in each direction from the fan, fan casing, or unit casing. Line all transfer ducts.
 - a. Where ductwork is exposed to weather or outside the building insulation envelope, provide 2 inch thick, 1-1/2 pound density internal lining with matte facing, with an R-Value of 8.0 minimum.
 - b. Where ductwork is within the building insulation envelope, lining shall be 1" thick, 1-1/2 pound density, with R-value of 4.2 minimum.
 - c. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
 - d. Where installed exposed in the conditioned space, duct shall be minimum 20 gauge with 1 inch insulation layer (minimum R-value – R-4.2).
 - e. Cement duct liner in place with nonflammable, non-hardening duct adhesive. Seal all raw edges of insulation inside ductwork with adhesive, including longitudinal liner edges.
 - f. Provide metal nosing at all locations where liner is preceded by unlined metal.
 - g. Provide sheet metal weld pins and washers or clinch pins and washers on all ductwork on 12 inch intervals with the first row within 3 inches of the leading edge of each piece of insulation and within 4 inches of corners. No use of adhesive mounted pins will be considered.
 - 1) Install clinched pin fasteners with properly adjusted automatic fastening equipment. Manual installation will not be considered.
 - 2) Install weld pins with properly adjusted automatic fastening equipment. Installation shall not damage the galvanized coating on the outside of the duct.
 - h. All ductwork, adhesives, lining, sealant, flex duct and the like shall have a flame spread of 25 or less and developed smoke rating of 50 or less when tested in accordance with one of the following test methods: NFPA 255, ASTM E84, or UL 723.
 - i. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

<u>Manufacturer:</u>	<u>Product:</u>
Johns Manville	Linacoustic RC
CertainTeed Corporation	ToughGard
Fosters Adhesive	85-62
Swifts Adhesive	7336

I. Round and Oval Ductwork Fabrication:

1. Round and oval duct and fittings shall be spiral lockseam or longitudinal seam as indicated in table below. Provide couplings to join each length of duct.
 - a. At contractors' option, round or oval ductwork may be utilized in place of rectangular ductwork shown on Drawings, provided available space allows installation of round or oval ductwork without compromising space required for installation of products and systems of other trades.
 - 1) Round or oval ductwork utilized in place of rectangular ductwork shown on Drawings shall be sized to have a static pressure loss equivalent to rectangular duct shown on Drawings.
 - 2) Unlined round or oval duct shall not be utilized in place of rectangular internally lined ductwork shown on Drawings.
2. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1.5 times associated duct width. Provide two-piece, die-stamped, 45-degree to 90-degree elbows for sizes up to 12 inches; five-piece, 90-degree elbows for sizes 12 inches and above; conical tees; and conical laterals. All reducers shall be placed after a tap has been made on the duct main. Reducers shall be long-taper style.
3. Round Ductwork: Construct of galvanized sheet steel complying with ANSI/ASTM A 653 by the following methods and in minimum gauges listed.

<u>Diameter</u>	<u>Minimum Gauge</u>	<u>Method of Manufacture</u>
Up to 14"	26	Spiral Lockseam
15" to 23"	24	Spiral Lockseam
24" to 36"	22	Spiral Lockseam
37" to 50"	20	Spiral Lockseam
51" to 60"	18	Spiral Lockseam
Over 60"	14	Longitudinal Seam

4. Provide locked seams for spiral duct; fusion welded butt seam for longitudinal seam duct.
5. Fittings and Couplings: Construct of minimum gauges listed. Provide continuous welds along seams at exposed ducts. Provide spot weld bonded seams at concealed ducts.

<u>Diameter</u>	<u>Minimum Gauge</u>
3" to 36"	20
38" to 50"	18
Over 50"	16

6. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
 7. Provide 20 gauge minimum for ductwork exposed within occupied spaces.
- J. Round Internally Insulated Duct and Fittings: Where ductwork is exposed to weather or outside the building insulation envelope, construct with outer pressure shell, 2 inch thick (Minimum R-value = R-8) insulation layer, and perforated inner liner. Where ductwork is within the building insulation envelope, construct with outer pressure shell, 1 inch thick (minimum R-value = R4.2) insulation layer, and perforated inner liner. Construct shell and liner of galvanized sheet steel complying with ANSI/ASTM A 653, of spiral lockseam construction (use longitudinal seam for over 59 inches), in minimum gauges listed in table below. Where installed exposed in the conditioned space: duct and fitting outer pressure shell shall be minimum 20 gauge with 1 inch insulation layer (minimum R-value = R-4.2), and perforated inner liner.

<u>Nominal Duct Diameter</u>	<u>Outer Shell</u>	<u>Inner Liner</u>
3" TO 12"	26 gauge	24 gauge
13" TO 24"	24 gauge	24 gauge
25" to 34"	22 gauge	24 gauge
35" to 48"	20 gauge	24 gauge
49" to 58"	18 gauge	24 gauge
Over 59"	16 gauge	20 gauge

1. Fittings and Couplings: Construct of minimum gauges listed. Provide continuous weld along seams of outer shell at exposed ducts. Provide spot weld bonded seams at concealed ducts.

<u>Nominal Duct Diameter</u>	<u>Outer Shell</u>	<u>Inner Liner</u>
3" to 34"	20 gauge	24 gauge
36" to 48"	18 gauge	24 gauge
Over 48"	16 gauge	24 gauge

2. Inner Liner: Perforate with 3/32 inch holes for 22 percent open area. Provide metal spacers welded in position to maintain spacing and concentricity.
3. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
4. Where installed exposed in the conditioned space, duct shall be minimum 20 gauge with 1 inch insulation layer (minimum R-value – R-4.2).
5. All ductwork, adhesives, lining, sealant, flex duct and the like shall have a flame spread of 25 or less and developed smoke rating of 50 or less when tested in accordance with one of the following test methods: NFPA 255, ASTM E84, or UL 723.
6. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Sheet Metal Div., McGill AirFlow, LLC., Acousti-k27
 - b. Semco Duct and Acoustical Products, Inc.
 - c. Air Systems Manufacturing, Inc. - Las Vegas

K. Duct Access Doors:

1. Duct Access: Provide hinged access door in rectangular ducts for access to fire dampers, control equipment, etc. Access door size shall be duct diameter wide by duct diameter high for all ducts under 24 inches. Ducts over 24 inches in diameter shall have 24-inch by 18-inch access doors. Minimum size access doors shall be 6 inches by 6 inches.
2. Provide hinged style access doors for round ductwork, NCA Manufacturing, Inc., Model AD-RD-87, Pottorff Series 60, or equal. Access doors shall be 16 gauge galvanized steel with continuous piano hinge. Locks shall be plated steel strike and catch. Provide 1" x 3/8" Polyethylene "Perma Stik" gasket all around door.

L. Flexible Air Ducts:

1. Provide exterior reinforced laminated vapor barrier, fiberglass insulation, encapsulated spring steel wire Helix, and impervious, smooth, non-perforated interior vinyl liner. Individual lengths of flexible ducts shall contain factory fabricated steel connection collars.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - 1) C.A. Schroeder, Inc., Cal Flex model 2PMJ.
 - 2) ThermaFlex model M KC.
2. Factory made air ducts shall be approved for the use intended and shall conform to the requirements of UL 181 and NFPA 90A. Each portion of a factory-made air duct system shall be identified by the manufacturer with a label or other suitable identification indicating compliance with UL 181, Class 1. Ducts shall be UL listed Class 1, maximum 25/50 smoke and flame spread and shall be installed in accordance with the terms of their listing and the requirements of SMACNA HVAC Duct Construction Standards (Metal and Flexible). Factory-made air ducts shall have the following minimum R-values: R-6.0 for ductwork installed within the building insulation envelope, R-8.0 for ductwork installed outside the building insulation envelope.
3. Flexible ductwork shall be maximum of 5 feet long, and shall be extended to the fullest possible length, in order to minimize pressure drop in the duct.
4. Flexible ducts shall be selected for minimum of 6 inch positive static pressure and minimum of 1 inch negative static pressure.
5. Duct Access Panels:
 - a. Provide duct access panel assembly of the same material and gauge used for the duct. Duct access panels shall conform to the following:
 - 1) Fasteners: Black steel or stainless steel to match material used for the duct. Panel fasteners shall not penetrate duct wall.
 - 2) Gasket: Comply with NFPA 96, grease-tight, high temperature ceramic fiber, rated for minimum 1500 °F.

M. Flexible Connectors:

1. Materials: Flame-retardant or noncombustible fabrics. Coatings and adhesives shall comply with UL 181, Class 1, with flame spread index of 25 or less, and smoke-developed index of 50 or less.
2. Metal-Edged Connectors: Factory fabricated with a fabric strip 3 inches wide attached to two strips of 3-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
3. Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - a. Minimum Weight: 26 oz./sq. yd.
 - b. Tensile Strength: Minimum 475 lbf/inch in the warp and minimum 375 lbf/inch in the filling.
 - c. Service Temperature: Minus 50 to plus 200 deg F.
4. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Ductmate Industries, Inc., model Proflex.
 - b. Ventfabrics, Inc., model Ventlon.

2.08 INSULATION MATERIALS

A. General:

1. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).
2. Products shall not contain asbestos, lead, mercury, or mercury compounds.
3. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
4. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
5. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
6. Test insulation, jackets and lap-seal adhesives as a composite product and confirm flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with UL723 or ASTM E84.
7. Adhesives and sealants shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.

B. Insulation Materials:

1. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Provide 2-inch wide stapling and taping flange.

- a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - 1) CertainTeed Corporation.
 - 2) Johns Manville.
 - 3) Knauf Insulation.
 - 4) Owens Corning.
- C. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Design Polymerics.
 - b. Foster Brand; H. B. Fuller Construction Products.
 - c. Knauf Insulation.
 2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
 3. Service Temperature Range: 0 to plus 180 deg F.
 4. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Design Polymerics.
 - b. Childers Brand; H. B. Fuller Construction Products.
 - c. Foster Brand; H. B. Fuller Construction Products.
 2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
 3. Service Temperature Range: Minus 50 to plus 220 deg F.
 4. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - a. Design Polymerics.
 - b. Childers Brand; H. B. Fuller Construction Products.
 - c. Foster Brand; H. B. Fuller Construction Products.

- d. Knauf Insulation.
- 2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
- 3. Service Temperature Range: 0 to plus 180 deg F.
- 4. Color: White.
- F. Field Applied Jackets:
 - 1. PVC Jacket and Factory Fabricated Fitting Covers: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
 - 1) Johns Manville, model Zeston, with Zeston 2000 fitting covers.
 - 2) Proto Corporation, model LoSmoke.

2.09 TEMPERATURE CONTROL SYSTEM

- A. Refer to Section 23 09 23, Direct Digital Control System for HVAC.

PART 3 - EXECUTION

3.01 FAN INSTALLATION

- A. Provide access doors for fans or motors mounted in ductwork.
- B. Mount all fans as detailed on Drawings and in compliance with CBC standards.
- C. Fan motors mounted in air-stream to be totally enclosed.
- D. Completely line supply, return or exhaust fan cabinets with 1 inch thick, 3/4 pound density acoustic insulation securely cemented in place.

3.02 AIR INLETS AND OUTLETS INSTALLATION

- A. Provide all air inlets and outlets with gaskets and install so that there will be no streaking of the walls or ceilings due to leakage. Duct connection to outlet on exposed duct shall be full size of outer perimeter of outlet flange.
- B. Unless otherwise indicated on Drawings, provide rectangular galvanized steel plenum on top of each diffuser and ceiling return for connection to ductwork. Line plenum with internal insulation as indicated for lined ductwork. Size plenum to allow full opening into air terminal. Plenum sheet metal gauge shall be equal to gauge for rectangular equivalent of the branch duct serving the air inlet or outlet.
- C. Ceiling-mounted air inlets, outlets, or other services installed in T-Bar type ceiling systems shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.

1. Air inlets, outlets, or other services weighing not more than 56 pounds shall have two No. 12 gauge hangers connected from the terminal or service to the structure above. These wires may be slack.
 2. Support air inlets, outlets, or other services weighing more than 56 pounds directly from the structure above by approved hangers. Provide 4 taut 12 gauge wires each, attached to the fixture and to the structure above. The 4 taut 12 gauge wires, including their attachment to the structure above must be capable of supporting 4 times the weight of the unit.
 3. Secure air inlets and outlets to main runners of ceiling suspension system with two No. 8 sheet metal screws at opposing corners.
- D. Furnish all air inlets and outlets with a baked prime coat unless otherwise noted. Provide off-white baked enamel finish on ceiling-mounted air inlets and outlets. Paint exposed mounting screws to match the material being secured.
- E. Air inlets and outlets shall match all qualities of these specified including appearance, throw, noise level, adjustability, etc.

3.03 FILTER HOUSING INSTALLATION

- A. Mount filters in airtight galvanized steel housings furnished by the filter manufacturer, or shop fabricated. Housings shall incorporate integral tracks to accommodate filters, and flanges for connection to duct or casing system.
1. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames and to prevent bypass of unfiltered air.
 2. Access Doors: Hinged, with continuous gaskets on perimeter and positive-locking latch handle devices.
- B. Air filters shall be accessible for cleaning or replacement.
- C. Identify each filter access door with 1/2 inch high minimum stenciled letters.

3.04 TEMPORARY FILTERS

- A. Provide temporary filters for fans that are operated during construction; after construction dirt has been removed from the building install new filters at no additional cost to the Owner. In addition to temporary filters at filter location, provide temporary filters on all duct openings which will operate under a negative pressure.
1. Filters used for temporary operation shall be the same as permanent filters for the application. Filters used for duct openings may be 1 inch thick pleated media disposable type.

3.05 DAMPER INSTALLATION

- A. All dampers automatically controlled by damper motors are specified under "Temperature Control System" except those specified with items of equipment.
- B. Provide opposed blade manual air dampers at each branch duct connection and at locations indicated on the drawings and where necessary to control air flow for balancing system. Provide an opposed blade balancing damper in each zone supply duct. Provide an access panel or Ventlok flush type damper regulator on ceiling or wall for each concealed damper.

- C. Install fusible link fire dampers full size of duct at points where shown or required.
- D. Provide 18 inch x 12 inch minimum hinged access doors in ductwork and furring for easy access to each fire damper; insulated access doors in insulated ducts. Label access doors with 1/2 inch high red letters.
 - 1. Provide Ventlok Series 100, Durodyne, or equal access doors with hardware for convenient access to all automatic dampers and other components of the system, insulated type in insulated ducts. Provide Ventlok #202 for light duty up to 2 inch thick doors, #260 heavy-duty up to 2 inch thick doors and #310 heavy-duty for greater than 2 inch thick doors. Provide #260 hinges on all hinged and personnel access doors; include gasketing.

3.06 DUCTWORK INSTALLATION

A. General:

- 1. Assemble and install ductwork in accordance with recognized industry practices which will achieve air tight and noiseless (no objectionable noise) systems capable of performing each indicated service. Install each run with minimum of joints. Align ductwork accurately at connections within 1/8 inch misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type which will hold ducts true to shape and to prevent buckling. Where possible, install ductwork to clear construction by 1/4 inch minimum, except at air inlets and outlets. Where ductwork will not clear construction, secure duct firmly to eliminate noise in the system.
- 2. Duct Joints: Install duct sealers, pop rivets or sheet metal screws at each fitting and joint. Duct sealers shall be fire retardant. Sheet metal screws for joints shall be minimum #10 size galvanized.
- 3. Where ductwork is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.
- 4. Horizontal runs of ductwork suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect.
- 5. Provide sheet metal angle frame at all duct penetrations to wall, floor, roof, or ceiling.
- 6. Paint inside of ducts, visible through grille, dull black.
- 7. Where ductwork is installed in finished areas of buildings that do not have ceilings, paint ductwork, support hangers, and air inlets and outlets to match adjacent architectural surfaces, or as directed by Architect.
- 8. At the time of rough installation, or during storage on the construction site and until final startup of the heating and cooling equipment, duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal, or other methods acceptable to the enforcing agency.

B. Firestopping:

- 1. Pack the annular space between duct openings and ducts penetrating floors and walls with UL listed fire stop, and sealed at the ends. All pipe penetrations shall be UL listed, Hilti, 3M Pro-Set, or equal.
 - a. Install fire caulking behind mechanical services installed within fire rated walls, to maintain continuous rating of wall construction.
 - 2. Firestopping systems to be installed in strict accordance with manufacturer's instructions.
 - 3. Alternate firestopping systems are acceptable if approved equal. However, any deviation from the above specification requires the Contractor to be responsible for determining the suitability of the proposed products and their intended use, and the Contractor shall assume all risks and liabilities whatsoever in connection therewith.
- C. Upper connection of support to wood structure shall be with wood screws or lag screws in shear fastened in the upper one half of the wood structural member. Fasteners shall conform to the following schedule:

For ducts with P/2=30"	#10 x 1-1/2" wood screw
For ducts with P/2=72"	1/4"x 1-1/2" lag screw
For ducts with P/2 over 73"	3/8"x 1-1/2" lag screw

- D. Upper connection in tension to wood shall not be used unless absolutely necessary. Where deemed necessary the contractor shall submit calculations to show the size fastener and penetration required to support loads in tension from wood in accordance with the following schedule:

For ducts with P/2=30"	260 pounds per hanger
For ducts with P/2=72"	320 pounds per hanger
For ducts with P/2=96"	460 pounds per hanger
For duct with P/2 larger than 120"	NOT ALLOWED

- E. Install concrete inserts for support of ductwork in coordination with formwork as required to avoid delays in work.
- F. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct plus insulation with sheet metal flanges of same gauge as duct. Overlap opening on four sides by at least 1-1/2 inches.
- G. Support ductwork in manner complying with SMACNA "HVAC Duct Construction Standards," hangers and supports sections. Where special hanging of ductwork is detailed or shown on Drawings, Drawings shall be followed. Angles shall be attached to overhead construction in a manner so as to allow a minimum of 2 inches of movement in all directions with no bending or sagging of the angle.
 - 1. Except where modified in individual paragraphs of this Section, provide hanger support with minimum 18 gauge straps, 1 inch wide. Fold duct strap over at bottom of duct.

2. Install duct supports to rectangular ducts with sheet metal screws. Provide one screw at top of duct and one screw into strap at bottom of duct.

H. Installation of Flexible Ductwork:

1. Provide flexible ducts with supports at 30 inch centers with 2 inch wide, 26 gauge steel hanger collar attached to the structure with an approved duct hanger. Installation shall minimize sharp radius turns or offsets.
 - a. Supports shall be in accordance with SMACNA HVAC Duct Construction Standards (Metal and Flexible).
 - b. Flexible duct bends shall be not less than 1-1/2 duct diameter bend radius.
2. Make connections to rigid duct and units with Panduit style draw band at inner liner material, and a second draw band over the outer vapor barrier material.
3. Make connection to duct with spin-in fittings, with air scoop and balance damper.

3.07 DUCTWORK SEALING AND LEAK TESTING

- A. All ductwork shall receive a Class A seal.
- B. Seal airtight all joints and seams, including standing seams and manufactured joints and seams, of all supply, return and exhaust ducts except those exposed in conditioned space.
- C. Leakage Classes:

<u>Pressure Class</u>	<u>Leakage Class</u>	
	<u>Round Duct</u>	<u>Rectangular Duct</u>
2"W.G. or less	8	16
4"W.G. or greater	2	4

- D. All duct systems (supply, return, outside air intake, and exhaust), except those identified on compliance forms on Drawings as requiring Acceptance Testing per the requirements of the California Energy Code, shall be tested in accordance with the requirements of SMACNA "HVAC Air Duct Leakage Test Manual." Test pressure shall be equal to the pressure class of the duct. For additional duct leak testing requirements, refer to Section 23 08 00.13, "Title 24 Commissioning of HVAC."

3.08 PIPING INSTALLATION

- A. General:
 1. All piping shall be concealed unless shown or otherwise directed. Allow sufficient space for ceiling panel removal.
 2. Installation of piping shall be made with appropriate fittings. Bending of piping will not be accepted.
 3. Install piping to permit application of insulation and to allow valve servicing.

4. Where piping or conduit is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.
 5. Horizontal runs of pipes and conduits suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect.
 6. Close ends of pipe immediately after installation. Leave closure in place until removal is necessary for completion of installation.
 7. Use reducing fittings; bushings shall not be allowed. Use eccentric reducing fittings wherever necessary to provide free drainage of lines and passage of air.
 8. Verify final equipment and fixture locations for roughing-in.
 9. Where piping is installed in walls within one inch of the face of stud, provide a 16 gauge sheet metal shield plate on the face of the stud. The shield plate shall extend a minimum of 1-1/2 inches beyond the outside diameter of the pipe.
 10. Each piping system shall be thoroughly flushed and proved clean before connection to equipment.
 11. Install exposed polished or enameled connections with special care showing no tool marks or threads at fittings.
 12. Service Markers: Mark the location of each plugged or capped pipe with a 4 inch round by 30 inch long concrete marker, set flush with finish grade. Provide 2-1/2 inch diameter engraved brass plate as part of monument marker.
 13. Pipe the discharge of each relief valve, air vent, backflow preventer, and similar device to floor sink or drain.
- B. Sleeves:
1. Install Adjus-to-Crete, Pipeline Seal and Insulator, or equal, pipe sleeves of sufficient size to allow for free motion of pipe, 24 gauge galvanized steel. The space between pipe and sleeves through floor slabs on ground, through outside walls above or below grade, through roof, and other locations as directed shall be caulked with oakum and mastic and made watertight. The space between pipe and sleeve and between sleeve and slab or wall shall be sealed watertight.
 2. At Contractor's option, Link-Seal, Metraflex Metraseal, or equal, casing seals may be used in lieu of caulking. Wrap pipes through slabs on grade with 1 inch thick fiberglass insulation to completely isolate the pipe from the concrete.
- C. Floor, Wall, and Ceiling Plates:
1. Fit all pipes with or without insulation passing through walls, floors, or ceilings, and all hanger rods penetrating finished ceilings with chrome-plated or stainless escutcheon plates.
- D. Firestopping:

1. Pack the annular space between pipe sleeves and pipes penetrating floors and walls with UL listed fire stop, and sealed at the ends. All pipe penetrations shall be UL listed, Hilti, 3M Pro-Set, or equal.
 - a. Install fire caulking behind mechanical services installed within fire rated walls, to maintain continuous rating of wall construction.
2. Provide SpecSeal Systems UL fire rated sleeve/coupling penetrators for each pipe penetration or fixture opening passing through floors, walls, partitions or floor/ceiling assemblies. All Penetrators shall comply with UL Fire Resistance Directory (Latest Edition), and in accordance with CBC requirements.
3. Sleeve penetrators shall have a built in anchor ring for waterproofing and anchoring into concrete pours or use the special fit cored hole penetrator for cored holes.
4. Copper and steel piping shall have SpecSeal, or equal, plugs on both sides of the penetrator to reduce noise and to provide waterproofing.
5. Firestopping systems to be installed in strict accordance with manufacturer's instructions.
6. Alternate firestopping systems are acceptable if approved equal. However, any deviation from the above specification requires the Contractor to be responsible for determining the suitability of the proposed products and their intended use, and the Contractor shall assume all risks and liabilities whatsoever in connection therewith.

3.09 PIPE JOINTS AND CONNECTIONS

A. General:

1. Cutting: Cut pipe and tubing square, remove rough edges or burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt and debris from inside and outside of pipe before assembly.
3. Boss or saddle type fittings or mechanically extracted tube joints will not be allowed.

B. Flexible Connections:

1. Furnish and install Thermo Tech., Inc. F/J/R, Metraflex, or equal, flexible couplings with limiter bolts on piping connections to all equipment mounted on anti-vibration bases, except fan coil units under 2000 cfm, on each connection to each base mounted pump and where shown. Couplings shall be suitable for pressure and type of service.
2. Anchor piping securely on the system side of each flexible connection.

3.10 HANGER AND SUPPORT INSTALLATION

- #### A. General:
- Support ductwork, equipment and piping so that it is firmly held in place by approved iron hangers and supports, and special hangers. Hanger and support components shall support weight of ductwork, equipment and pipe, fluid, and pipe insulation based on spacing between supports with minimum factor of safety of five based on ultimate strength of material used. Do not exceed manufacturer's load rating. Pipe attachments or hangers, of same size as pipe or tubing on which used, or nearest available. Rigidly fasten hose faucets, fixture stops, compressed air outlets, and similar items to the building construction. The Architect shall approve hanger material before installation. Where building structural

members do not match piping and ductwork support spacing, provide "bridging" support members firmly attached to building structural members in a fashion approved by the structural engineer.

- 1. Materials, design, and type numbers for support of piping per Manufacturers' Standardization Society (MSS), Standard Practice (SP)-58.
 - a. Provide copper-plated or felt-lined hangers for use on uninsulated copper tubing.
- 2. Materials and design for ductwork support shall be per SMACNA "HVAC Duct Construction Standards, Metal and Flexible."
- B. Hanger components shall be provided by one manufacturer: B-Line, Grinnell, Unistrut, Badger, or equal.
- C. Duct Hanger and Support Spacing: Conform to Requirements of CMC and SMACNA "HVAC Duct Construction Standards, Metal and Flexible."
- D. Duct Support to Structure:
 - 1. Upper connection of support to wood structure shall be with wood screws or lag screws in shear fastened in the upper one half of the wood structural member. Fasteners shall conform to the following schedule:

For ducts with P/2=30"	#10 x 1-1/2" wood screw
For ducts with P/2=72"	1/4"x 1-1/2" lag screw
For ducts with P/2 over 73"	3/8"x 1-1/2" lag screw

- 2. Upper connection in tension to wood shall not be used unless absolutely necessary. Where deemed necessary the contractor shall submit calculations to show the size fastener and penetration required to support loads in tension from wood in accordance with the following schedule:

For ducts with P/2=30"	260 pounds per hanger
For ducts with P/2=72"	320 pounds per hanger
For ducts with P/2=96"	460 pounds per hanger
For duct with P/2 larger than 120"	NOT ALLOWED

- 3. Install concrete inserts for support of ductwork in coordination with formwork as required to avoid delays in work.
- 4. Upper connection to manufactured truss construction must comply with truss manufacturers published requirements and Structural Engineers requirements.

3.11 INSULATION AND FIELD-APPLIED JACKET INSTALLATION

- A. General:

1. The term "piping" used herein includes pipe, air separators, valves, strainers and fittings.
2. Clean thoroughly, test and have approved, all piping and equipment before installing insulation and/or covering.
3. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, ductwork, and equipment.
4. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment as specified in insulation system schedules.
5. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
6. Install insulation with longitudinal seams at top and bottom of horizontal runs.
7. Install multiple layers of insulation with longitudinal and end seams staggered.
8. Keep insulation materials dry during application and finishing.
9. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
10. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
11. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
12. For piping, ductwork, and equipment, with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.
13. Repair all damage to existing pipe, duct and equipment insulation whether or not caused during the work of this contract, to match existing adjacent insulation for thickness and finish, but conforming to flame spread and smoke ratings specified above.
14. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - a. Install insulation continuously through hangers and around anchor attachments.
 - b. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - c. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

- d. Cover inserts with jacket material matching adjacent insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

B. Duct Insulation Installation:

1. General:

- a. Insulation applied to the exterior surface of ducts located in buildings shall have a flame spread of not more than 25 and a smoke-developed rating of not more than 50 when tested as a composite installation including insulation, facing materials, tapes and adhesives as normally applied. Material exposed within ducts or plenum shall have a flame-spread rating of not more than 25 and a smoke-developed rating of not more than 50.
- b. Duct insulation applied to the exterior surface of ducts installed outside the building insulation envelope shall meet minimum R-value of R-8 at 3 inches thickness and 3/4 pound per cubic foot density.
- c. Duct insulation applied to the exterior surface of ducts installed within the building insulation envelope shall meet minimum R-value of R-4.2 at 1-1/2 inches thickness and 3/4 pound per cubic foot density.

2. Mineral Fiber Blanket Installation:

- a. Insulate all unlined concealed supply and return ducts with fiberglass duct wrap, manufactured as a blanket of glass fibers factory laminated to a reinforced foil/kraft vapor retarding facing. Provide 2 inch stapling and taping flange. Wrap insulation entirely around duct and secure with outward clinching staples on 6 inch centers. Provide mechanical fasteners at maximum 18 inch centers for all bottoms of duct which are greater than 24 inches. Lap all insulation joints 3" minimum. Insulate ducts installed tight against other work before hanging in place. Seal all seams, both longitudinal and transverse, and all staple and mechanical fastener penetrations of facing with scrim backed foil tape or recommended sealant, to provide a vapor tight installation.

3. PVC Jacket Installation:

- a. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.
 - 1) Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.12 TEMPERATURE CONTROL SYSTEM INSTALLATION

- A. Provide thermostats where indicated on drawings. All wiring shall be in conduit. Provide all relays, transformers and the like to render the control system complete and fully operable. All control conduit to be rigid steel type.

3.13 EQUIPMENT START-UP

- A. Initial start-up of the systems and pumps shall be under the direct supervision of the Contractor.

- B. Equipment start-up shall not be performed until the piping systems have been flushed and treated and the initial water flow balance has been completed.
- C. It shall be the responsibility of the Contractor to assemble and supervise a start-up team consisting of controls contractor, start-up technician, and test and balance contractor; all to work in concert to assure that the systems are started, balanced, and operate in accordance with the design.
- D. After start-up is complete, instruct the Owner's personnel in the operation and maintenance of the systems. Obtain from the Owner's representative a signed memo certifying that instruction has been received.
- E. For additional requirements, refer to article, Check, Test and Start Requirements, in Section 23 00 50, Basic HVAC Materials and Methods.

3.14 TESTING AND BALANCING

- A. For testing and balancing requirements, refer to Section 23 05 93, Testing and Balancing for HVAC.

3.15 CLEANING AND PROTECTION

- A. As each duct section is installed, clean interior of ductwork of dust and debris. Clean external surfaces of foreign substances that might cause corrosive deterioration of metal or where ductwork is to be painted.
- B. Strip protective paper from stainless steel ductwork surfaces, and repair finish wherever it has been damaged.
- C. Temporary Closure: At ends of ducts that are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering that will prevent entrance of dust and debris until connections are to be completed.
- D. As each internally lined duct section is installed, check internal lining for small cuts, tears, or abrasions. Repair all damage with fire retardant adhesive.

3.16 EQUIPMENT MOUNTING

- A. Mount and anchor equipment in strict compliance with Drawings details. Alternate anchorage methods will not be considered for roof mounted equipment.

3.17 INDOOR DUCT INSULATION SCHEDULE

- A. Ducts Located Within Building Thermal Envelope:
 - 1. Minimum R-Value = R-4.2.
 - 2. Supply and Return Ducts: Mineral Fiber Blanket, 1-1/2 inches thick, 0.75 lb/cu. ft.
- B. Ducts Located Within Building Outside Thermal Envelope:
 - 1. Minimum R-Value – R-8.0.
 - 2. Supply and Return Ducts: Mineral Fiber Blanket, 3 inches thick, 0.75 lb/cu. ft.

3.18 OUTDOOR DUCT INSULATION SCHEDULE.

- A. Minimum R-Value = R-8.
- B. Refer to article, Ductwork, for internal duct lining. Provide 2 inches thick internal duct lining where indicated on Drawings.

3.19 INDOOR FIELD-APPLIED DUCT JACKET SCHEDULE

- A. Insulated ducts in concealed spaces: None.
- B. Insulated ducts in exposed unconditioned spaces: PVC, 20 mils thick.

END OF SECTION

SECTION 26 05 00
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to provide and install the Electrical Work as shown on the drawings and as specified hereinafter, including, but not limited to the following:
 - 1. Panel modifications and circuit breakers.
 - 2. Branch circuit wiring, wiring devices and connections to all equipment requiring electrical service.
 - 3. Lighting fixtures completely lamped, including switches, raceways and wiring.
 - 4. Telecommunications station cabling.
 - 5. Lighting controls and programming.
 - 6. All required incidental work, such as electrical testing, title 24 acceptance testing, and temporary power.
 - 7. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the the drawings.
 - 8. It is the intent of the drawings and specifications that systems be complete and, except as otherwise noted, be ready for operation.

1.02 RELATED WORK

- A. Division 1 - General Requirements
- B. Division 9 - Finishes

1.03 INCORPORATED DOCUMENTS

- A. Requirements of the General Conditions, Supplementary Conditions, and Division 1 Sections apply to all work in this Section, unless modified herein.
- B. Published specifications, standard tests or recommended methods of trade, industry or government organizations apply to work of this Section where cited by abbreviations noted below, unless modified herein.
 - 1. 2022 California Code of Regulations.
 - 2. 2022 California Building Standards Administrative Code, Part 1, Title 24, C.C.R.
 - 3. 2022 California Building Code (CBC), Part 2, Title 24, C.C.R. (Based on 2021 International Building Code with 2022 California Amendments).
 - 4. 2022 California Electrical Code (CEC), Part 3, Title 24, C.C.R. (Based on 2017 National Electrical Code with 2022 California Amendments).
 - 5. California Energy Code, Part 6, Title 24, C.C.R.
 - 6. 2022 California Green Building Standards (CALGreen) Code, Part 11.
 - 7. American Society of Civil Engineers 7-16 (ASCE/SEI), Minimum Design Loads for Buildings and Other Structures.
 - 8. Underwriters' Laboratories, Inc. (UL).
- C. All State and Municipal Codes and Ordinances.

1.04 CONDITIONS AT SITE:

- A. Visit to site is required of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.
- B. Lines of other services that are damaged as a result of this work shall promptly be repaired at no expense to the Owner to the complete satisfaction of the Owner.

1.05 QUALITY ASSURANCE

- A. Conformance:
 - 1. All work shall conform to the applicable requirements of Article 1.03 above.
 - 2. The Contractor shall notify the Architect, prior to submission of bid, about any part of the design, which fails to comply with abovementioned requirements.
 - 3. If after contract is awarded, minor changes and additions are required by aforementioned authorities, even though such work is not shown on the drawings or covered in the specifications, they shall be included at Contractor's expense.
- B. Coordination:
 - 1. The Contractor shall become familiar with the conditions at the job site, and with the drawings and specifications and plan the installation of the electrical work to conform with the existing conditions and that shown and specified so as to provide the best possible assembly of the combined work of all trades.
 - 2. The Contractor shall work out in advance all "tight" conditions, involving all trades and if found necessary, supplementary drawings shall be prepared by this Contractor, for the Architect's approval, before work proceeds in these areas. No additional costs will be considered for work, which must be relocated due to conflicts with the work of other trades.
 - 3. The Contractor shall coordinate and verify all backbox, device, lighting fixture, or equipment mounting requirements with the devices or equipment to be installed, prior to rough in.

1.06 SUBMITTALS

- A. Product Data:
 - 1. Comply with the provisions of Section 01 33 00 - Submittals.
 - 2. Within 15 days after award of the Contract, submit:
 - a. Complete electrical, lighting, and signal systems material list of all items proposed to be furnished and installed under this Division. Provide manufacturers data sheets for all devices, raceways, fixtures, equipment, and related products to be used for the Division 26 work.
 - b. Manufacturers' specifications and other data required demonstrating compliance with the specified requirements.
 - c. Manufacturers' recommended installation procedures which, when approved by the Architect, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.
 - 3. Shop Drawings: Furnish shop drawings and/or equipment cuts for the following:
 - a. Light fixtures including lamps and ballasts
 - b. Lighting controls
 - c. Power and signal floor duct monuments.
 - 4. Maintenance and Operating Manuals:
 - a. Systems Description: Description of operating procedures.
 - b. Controls: Diagrams and description of operation of each system.
 - c. Equipment: Manufacturer's brochures, ratings, certified shop drawings, maintenance data, and parts lists with part numbers. Mark each sheet with equipment identification number and actual installed condition.
 - d. Materials and Accessories: Manufacturer's brochures, parts lists with part numbers, and maintenance data where applicable. Mark each sheet with identification number of system and location of installation.

- e. The Maintenance and Operation Manual shall be presented in a bookmarked PDF file with tabbed sections as stated below. Provide all information in each section as stated below.
 - 1) 26 5101:
 - (a) Insert the approved submittals for the light fixtures.
 - (b) Highlight the lamp type that was installed for each light fixture.
 - (c) Provide the names, address and telephone numbers of the manufacturer and the closest manufacturer's representative for each light fixture.
 - 2) 26 5101:
 - (a) Insert the approved submittals for the motion sensing light control equipment.
 - (b) Insert all operating instructions.
 - (c) Provide the names, address and telephone number of the manufacturer and the closest manufacturer's representative of the equipment.
 - (d) Include the manufacturer's recommended maintenance of the equipment.
 - 3) 26 0800:
 - (a) Insert all systems testing results.
5. Record Documents: "As-builts": As specified under Paragraph 3.2 of this Section.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all trades.
- B. Delivery and Storage: Deliver all materials to the job site in their original containers with all labels intact and legible at time of use. Store in strict accordance with approved manufacturers' recommendations.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.
- D. This Contractor shall personally, or through an authorized representative, check all materials upon receipt at jobsite for conformance with approved shop drawings and/or plans and specifications.

1.08 SCHEDULING/SEQUENCING

- A. 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 the construction schedule, together with any special handling charges, shall be borne by this Contractor.
- B. The Contractor shall coordinate production and delivery schedule for all Owner-supplied equipment with the equipment suppliers to ensure that all Owner-supplied equipment is delivered to site in coordination with the construction schedule and in such a manner as to cause no delays in completion of the Contract as scheduled.

1.09 REQUIREMENTS

- A. The contract drawings indicate the extent and general arrangements of the conduit wiring systems, etc. If any departures from the contract drawings are deemed

necessary by the Contractor, details of such departures and the reasons therefore shall be submitted as soon as practicable, and within thirty-five (35) days after award of the electrical contract.

- B. Unless material list and data is received as a complete and all-inclusive submittal within the stipulated time all items shall be provided as specified, with no deviations permitted.
- C. Any and all additional costs incurred by the substitution of electrical material or equipment, or installation thereof, whether architectural, structural, plumbing, mechanical or electrical, shall be borne by the Contractor under this Section.
- D. Burden of proof of equality of any substitution for a specified product is the responsibility of this Contractor.
- E. Where required by Architect to ascertain equality of substitute product, Contractor may be requested to provide the specified item and the submitted substitution for comparison, at no additional cost to the Owner.

1.10 DESCRIPTION OF DEMOLITION AND REPLACEMENT WORK

- A. This project includes the demolition and replacement, modification, or enhancement of an existing Library facility. As such, the project scope for this contractor shall include all associated electrical, lighting, and signal system upgrades and demolition/removal work at the existing building. The intent is that all systems will be complete and functional at the completion of this contract and that all old systems, equipment, feeders, circuits, wiring, and related devices (no longer used) be completely and neatly removed. Where discrepancies between the drawings and existing conditions are noted, the Architect or Owner shall be notified immediately for resolution.
- B. As with every renovation project, the electrical work will include (and require) exploration and other field work on a daily basis to complete the new designed equipment and connections within the constraints of the existing building and existing site conditions.
- C. The contractor shall include as part of the base bid, sufficient labor hours to provide such exploration and field work throughout the duration of the project. Change orders for miscellaneous coordination of existing conditions will not be approved unless specific and latent conditions are uncovered that warrant such additional compensation or require additional work not shown on the drawings or included in the specifications, or implied by the designed conditions.
- D. New raceways and wiring to new and renovated equipment are to be installed unless otherwise noted. Where raceways are installed in accessible concealed locations (i.e. unfinished spaces or electrical / mechanical / attic spaces), EMT with wire shall be used. Where new wiring is required to be routed through existing walls and ceilings that cannot readily be accessible for new conduit, MC cable or flex conduit and wiring may be installed, fished through and secured in each space as required by Code. Non-metallic sheathed cable shall not be utilized on this project.
- E. All new raceways shall be installed concealed and all new equipment installed flush, unless otherwise noted on the drawings or in these specifications.

1.11 GUARANTEE

- A. This Contractor shall guarantee that all work executed under this Section will be free from defects of materials and workmanship for a period of one (1) year or as per the General Conditions of this project, whichever is longer. Dates shall be from the date of final acceptance of the building. The contractor shall further guarantee

that he will, at his own expense, repair and replace all such defective work, and all other work damaged thereby, which becomes defective during the term of the guarantee. Such repair or replacement shall be guaranteed for one (1) year from the date of repair or replacement.

1.12 PERMITS AND INSPECTIONS

- A. This Contractor shall arrange for and obtain all required permits and inspections.
- B. Do not allow or cause any of the work to be covered or enclosed until it has been tested and/or inspected.

1.13 IDENTIFICATION

- A. Switchgear, switchboards, distribution panels, and feeder circuit breakers therein, panels, disconnect switches, motor starters, transformers, motor disconnect switches, cabinets, and other apparatus used for the operation of, or control of circuits, appliances or equipment, shall be properly identified by means of engraved laminated plastic descriptive nameplates mounted on apparatus using stainless steel screws. Nameplates shall have white letters with black background and be submitted to the Architect for approval. Cardholders in any form are not acceptable.
- B. Provide p-touch style labeling of circuit designations for all receptacles on the project.
- C. Each branch circuit of panel boards to have a permanently fixed number with load directory, mounted under celluloid on inside of cabinet door, showing circuit numbers and typewritten description of equipment supplied by breakers. Where changes are made to existing panelboards, newly typewritten circuit directories shall be prepared to replace existing directories.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Refer to applicable Division 26 Sections for complete products specifications.

2.02 MATERIALS

- A. Materials of the same type or classification, used for the same purpose, shall be the product of the same manufacturer.

2.03 ACCEPTABLE MANUFACTURERS

- A. Materials shall be of make mentioned elsewhere in this specification. All materials shall be the best of their several kinds, perfectly new and approved by the Underwriters' Laboratories.
- B. Where material, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish standards of desired quality, style and utility and shall be the basis of the bid. Materials so specified shall be furnished under the contract unless changed by written approval of the Architect. Where two or more designations are listed, choice shall be optional with this Contractor, but this Contractor must submit his choice for final approval.

2.04 POSTED OPERATING INSTRUCTIONS

- A. Furnish approved operating instructions for systems and equipment where indicated in the technical sections for use by operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic.

Post instructions as directed. Attach or post operating instructions adjacent to each principal system and equipment including startup, proper adjustment, operating, lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each system or equipment. Provide weather-resistant materials or weatherproof enclosures for operating instruction exposed to the weather. Operating instruction shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

2.05 CATALOGED PRODUCTS/SERVICE AVAILABILITY

- A. Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The 2-year period shall be satisfactorily completed by a product for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished. The equipment items shall be supported by service organizations which are reasonable convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which the work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Drawings:
 - 1. The general arrangement and location of wiring and equipment is shown on the electrical drawings and shall be installed in accordance therewith, except for minor changes required by conflict with the work of other trades.
 - 2. The Contractor shall coordinate and verify all backbox, device, lighting fixture, or equipment mounting requirements with the devices or equipment to be installed, prior to rough in.
 - 3. Drawings indicate the circuit and panel which supplies each device or fixture. Provide and install conduit and conductors to make all connections from panel to nearest device and from first device to additional devices on same circuit. Conduit size and fill shall satisfy NEC requirements. Two or three different phases supplied by a 3-phase panel may share a single neutral only if circuit positions are adjacent in the panel. Do not exceed 4 #12 or 3 #10 conductors in a 1/2" conduit, 7 #12 or 5 #10 in a 3/4" conduit, and 11 #12 or 9 #10 in a 1" conduit, unless otherwise noted. Provide common handle-tie on breakers for multi-wire branch circuits (with common neutral), per NEC. If more than three current carrying conductors are installed in one conduit, conductor size shall be increased as required per NEC. Do not share neutrals for branch circuit runs to electronic equipment or where noted on the drawings.
 - 4. Drawings indicate the location of all light switches. Where fixtures in a room are controlled by more than one switch, the same lower case letter is drawn adjacent to a switch and each fixture controlled by that switch. Where no lower case letter is adjacent to a switch, all fixtures in the room are controlled

by that switch. Provide and install conduit and wire from fixture to switch and between fixtures as required to accomplish switching shown. Do not route branch circuit wiring for light fixtures through switch boxes. Where dimming controls are specified, provide required dimming control wiring in addition to power wiring from control device to all controlled light fixtures. Provide separate conduit for dimming control wiring unless otherwise indicated on the drawings.

5. Drawings indicate location of all signal outlet boxes. Provide and install conduit system as required and complete system wiring, unless otherwise noted.
 6. Control wiring is generally not shown on the plans. Contractor shall refer to control diagrams and provide and install all wiring and raceways required to make all interconnections.
 7. All branch circuit wiring No. 12 or No. 10 as noted, all control wiring No. 14, except as noted next to "slash marks" on the drawings, or as noted under "Wire," as specified herein.
 8. All dimensions, together with locations of doors, partitions, etc. are to be taken from the Architectural Drawings, verified at site by this Contractor.
 9. Maintain "as-built" records at all times, showing the exact location of concealed conduits and feeders installed under this contract, and actual numbering of each circuit. Upon completion of work and before acceptance can be considered, this Contractor must forward to the Architect, updated CAD plans, corrected to show the electrical work as actually installed.
 10. All standard 20A branch circuit conductors shall be #12 minimum for up to 75 linear circuit feet, #10 minimum for up to 150 linear circuit feet, and #8 for runs longer than 150 feet.
- B. Measurements: Before ordering any material or closing in any work, verify all measurements on the job. Any differences found between dimensions on the drawings and actual measurements shall be brought to the Architect's attention for consideration before proceeding.

3.03 FIELD QUALITY CONTROL

- A. All workmanship shall be first class and carried out in a manner satisfactory to and approved by the Architect.
- B. This Contractor shall personally, or through an authorized and competent representative, constantly supervise the work and so far as possible keep the same foreman and workmen on the job throughout.

3.04 INSTALLATION/APPLICATION/ERECTION

- A. All electrical raceways and devices shall be installed concealed (for raceways) and/or flush mounted (for devices), unless otherwise noted. Provide cut-in boxes and "fish" flexible MC or flex conduit and wire through existing walls to remain, unless shown otherwise on plans. Cut and patch to facilitate such installation to match adjacent and original finish.
- B. All cutting, repairing and structural reinforcing for the installation of this work shall be done by the General Contractor in conformance with the Architect's requirements.

3.05 TEMPORARY LIGHTING AND POWER

- A. Provide and install temporary lighting and power systems for the duration of construction, of adequate size to accommodate the required lighting and power loads. Coordinate with other trades to insure adequate sizing.

- B. Provide distribution equipment as required to support all construction activities.

3.06 FIRE STOPPING AND FIRE RATED PENETRATIONS

- A. All electrical equipment mounted in, on, or through fire rated construction shall be installed to maintain the fire rating of the construction.
- B. Provide fire rated pads (or other suitable assembly) around all electrical junction boxes in fire rated walls/ceilings/floors to maintain the fire rating.
- C. Provide fire rated construction around all recessed light fixtures and/or panel board / cabinets mounted flush in fire rated walls to maintain the fire rating. Coordinate depth of construction with other trades to avoid conflicts.
- D. Conduit sleeves shall be provided as a means of routing cables through fire-rated walls or floors. Openings in sleeves and conduits used for system cables and those which remain (empty) spare shall be sealed with an approved fireproof, removable sagging material. Sleeves which pass vertically from floor to floor shall be sealed in a similar manner using an approved re-enterable system. Additional penetrations through rated assemblies necessary for passage of tel/data wiring shall be made using an approved method and permanently sealed after installation of cables.

3.07 ADJUSTING AND CLEANING

- A. All electrical equipment, including existing equipment not "finish painted" under other sections, shall be touched up where finished surface is marred or damaged.
- B. All equipment, lighting fixtures, etc., shall be left in clean condition, with all shipping and otherwise unnecessary labels removed there from.

3.08 SCHEDULES

- A. Coordination: Coordinate installation of electrical items with the schedule for other work to prevent unnecessary delays in the total Work.

3.09 WARNING SIGN MOUNTING

- A. Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

3.10 PAINTING OF EQUIPMENT

- A. Factory Applied: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test, except equipment specified to meet requirements of ANSI C37.20 shall have a finish as specified in ANSI C37.20.
- B. Field Applied: Paint electrical equipment as required to match finish or meet safety criteria. Painting shall be as specified in the respective equipment section.

3.11 TESTS

- A. Testing and inspection: See Section 26 08 00 - Testing.

END OF SECTION

SECTION 26 08 00
TESTING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Work Included in This Section: All materials, labor, equipment, services, and incidentals necessary to perform the testing and inspection of the electrical work, including but not limited to the general systems noted below:
1. Grounding system.
 2. Lighting system.
 3. Distribution system.
 4. Lighting control system.
 5. Telecommunications system.
 6. Title 24 Acceptance Testing.
 7. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.
 8. All work shall comply with Sections 26 05 00 and 26 27 00.
 9. In addition to the general system tests and inspections indicated above, the Contractor shall perform the following inspections and tests. The Contractor shall provide all material, equipment, labor, and technical supervision to perform such tests and inspections:
 - a. System Grounding.
 - b. Panelboards.
 10. The purpose of these tests is to assure that all tested electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.

1.02 APPLICABLE CODES, STANDARDS, AND REFERENCES

- A. All inspections and tests shall be in accordance with the International Electrical Testing Association - Acceptance Testing Specifications ATS-2021 (referred to herein as NETA ATS-2021).

1.03 QUALIFICATIONS

- A. Qualifications of the Testing Firm shall be as listed in NETA ATS-2021.

PART 2 - PRODUCTS

2.01 THIS ARTICLE DOES NOT APPLY TO TESTING.

PART 3 - EXECUTION

3.01 GENERAL

- A. Final test and inspection to be conducted in presence of the Authority having Jurisdiction (AHJ) or Inspector of Record (IOR). Test shall be conducted at the expense of, and managed by, the Contractor, at a mutually agreed time. Submit written test report of all tests, with test result values and overall outcome.
- B. All portions of the electrical installation shall be inspected and tested to ensure safety to building occupants, operating personnel, conformity to code authorities and Contract Documents, and for proper system operation.

3.02 INSPECTIONS AND TESTS

- A. Tests: Field tests shall be performed and reports submitted, as per Section 26 05 00, Part 1.

1. Final Inspection Certificates: Prior to final payment approval, deliver to the Owner, with a copy to the Architect, signed certificates of final inspection by the appropriate local authority having jurisdiction.
 2. Grounding System:
 - a. All ground connections shall be checked and the entire system shall be checked for continuity.
 - b. Ground tests shall meet or exceed the requirements of the National Electric Code.
 3. Lighting Systems:
 - a. The lighting systems shall be checked for proper local controls and operation of entire installation, including the operation of the low voltage lighting control system.
 4. Power Distribution System:
 - a. Test panelboards for grounds and shorts with mains disconnected from feeders, branch circuits connected and circuit breakers closed, all fixtures in place and permanently connected and grounding jumper to neutral lifted and with all wall switches closed.
 - b. Test each individual circuit at each panelboard with equipment connected for proper operation. Inspect the interior of each panel.
 - c. Check verification of color coding, tagging, numbering, and splice make-up.
 - d. Verify that all conductors associated with each circuit are in same conduit.
 - e. Demonstrate that all lights, jacks, switches, outlets, and equipment operate satisfactorily and as called for.
 5. Lighting Control System: Verify that all equipment, components, and devices function as specified.
 6. Telecommunications System: Verify that all equipment, components, and devices function as specified.
- B. Title 24 Acceptance Testing: Contractor shall complete the requirements for Title 24 Acceptance Testing, as per CA Title 24, Part 6.
1. Perform testing requirements as per Title 24 Lighting Acceptance requirements. Testing shall include construction inspection of installed controls, occupancy / motion sensor testing, manual daylighting controls testing, automatic time switch controls testing, and demand response system interface, as applicable.
 2. Complete and submit all required forms for complete Acceptance Testing.
 3. Acceptance tests must be performed or overseen by certified Acceptance Test Technicians.
 4. Obtain required review and approval of Acceptance Forms to allow final certificate of occupancy to be granted.

END OF SECTION

SECTION 26 27 00
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the electrical work as shown on the drawings and as specified hereinafter, including but not limited to the work listed below:
 - 1. Raceways, feeders, branch circuit wiring, wiring devices, safety switches and connections to all equipment requiring electric service.
- B. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.
- C. All work shall comply with Section 26 05 00.

1.02 SUBMITTALS

- A. Comply with the provisions of Section 26 05 00.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Refer to Section 26 05 00, Basic Electrical Requirements, Part 2 - Products.
- B. List of Equipment Manufacturers:
- C. Conduit and Conduit Fittings
 - 1. Allied Tube and Conduit, Wester Tube and Conduit, LTV Steel Tubular, National Electric Products, AFC, Republic Steel Corporation, Rome Cable Corporation, United States Steel Corporation, Killark Electric Manufacturing Company, Raco, VAW Aluminum Company, Bridgeport, Steel City, Thomas & Betts, Carlon, O.Z. Gedney, Appleton, Regal.
- D. Wire and Cable (600V)
 - 1. American Wire Company, General Wire and Cable Corporation, Okonite Company, Rome Cable Corporation, Cerrowire, American Insulated Wire, AFC Cable Systems, Essex, Simplex Wire and Cable Company, Southwire.
- E. Solderless Lugs and Grounding Connections
 - 1. Burndy Engineering Company Inc, O.Z. Gedney Company Inc, Penn Union Electric Corporation, Thomas and Betts Company Inc.
- F. Pull Boxes, Gutters, Special Cabinets
 - 1. Schneider-Square D Company, Columbia Electric Manufacturing Company, General Electric Company, Eaton Inc.
- G. Outlet Boxes
 - 1. Appleton Electric Company, Killark Electric Manufacturing Company, Lew Electric Fittings Company, National Electric Products Corporation, Raco, Steel City Electric Company, Carlon, Bowers.
- H. Wiring Devices
 - 1. Leviton, Arrow-Hart, Cooper, Hubbell, Lutron, Bryant.
- I. Conduit Racks, Hangers
 - 1. General Electric Company, Killark Electric Manufacturing Company, Caddy, National Electric Products Corporation, Republic Steel Corporation, Rome Cable Corporation, United States Steel Corporation, VAW Aluminum Company, Superstrut, B-Line.
- J. Safety Switches (Disconnect and Fusible)

1. Schneider-Square D Company, Eaton-Cutler Hammer Inc, General Electric Company.
- K. Fuses
1. Bussman Manufacturing Company, Chase-Shawmut Company.
- L. Firestopping
1. 3M, Nelson.

2.02 MATERIALS

- A. Raceways: Only the raceways specified below shall be utilized on this project. Substitutions shall be pre-approved in writing. All bare conduit ends (stub-ups or stub-outs) shall be provided with bushed ends or manufactured insulated throat connectors:
1. Electrical metallic tubing shall be used exposed in interior electrical and mechanical rooms, in interior unfinished spaces, and in interior concealed and furred spaces, made up with steel watertight or steel set screw type fittings and couplings. EMT shall not be used in under-building crawl spaces or other areas subject to moisture. Set screws shall have hardened points. Die-cast zinc fittings are unacceptable.
 2. Surface mounted rectangular steel raceways and boxes: use for all surface mounted installations, unless otherwise noted (all catalog numbers listed are Wiremold - equals allowed) - color Ivory, unless otherwise noted;
 - a. #V500 for branch power runs on ceilings and walls (used with V500 series straps, elbows, connectors and V5000 series low profile boxes and covers).
 - b. #2000 or 2400 low profile for larger power run requirements on ceiling or walls (used with V2000 series straps, elbows, connectors and low profile boxes and covers).
 - c. #2400D for dual service power and tel/data run requirements (used with divided V2400 boxes and covers).
 3. Surface mounted rectangular non-metallic dual service raceways; Wiremold #5400 (Ivory) or equal with all required compatible activation covers, bezels, inserts, and blank plates for a complete installation. Refer to drawings for outlet quantities in raceway and feed points. All raceway fed flush from rear with horizontal j-boxes, unless otherwise noted.
 4. Use flexible conduit for all motor, transformer and recessed fixture connections, minimum 1/2"; "Seal tite" type used outdoors and in all wet locations, provide with code size (minimum No. 12) bare ground wire in all flexible conduit.
 5. All conduit cuts (factory or field cut) shall be perfectly square to the length of the conduit and cut ends shall be reamed with a reaming tool to provide a smooth edge to the passing conductors and to remove all burrs and scrapes. Use of a hand file is not acceptable.
 6. All electrical raceways shall be installed concealed, unless otherwise noted. Cut and patch to facilitate such installation to match adjacent and original finish. All exposed conduits, where required, shall be installed parallel to building members.
 7. Where existing conditions preclude the installation of EMT in existing walls to remain, provide and install cut-in type boxes and "fish" flexible MC or flex conduit and wire through existing walls to remain, unless shown otherwise on plans.
 8. Fasten conduits securely to boxes with locknuts and bushings to provide good electrical continuity.

9. Provide chrome escutcheon plates at all exposed wall, ceiling and floor conduit penetrations.
 10. Support individual suspended conduits with heavy malleable strap or rod hangers; supports for 1/2 inch or 3/4 inch conduit placed on maximum 7-foot centers; maximum 10-foot centers on conduits 1 inch or larger.
 11. Support multiple conduit runs from Kindorf B907 channels with C-105 and C-106 straps.
 12. Conduit bends - long radius.
 13. Flash conduits through roof, using approved roof jack; coordinate with General Contractor.
 14. To facilitate pulling of feeder conductors, install junction boxes as shown or required.
 15. All empty conduits on the project shall be provided with a nylon pull rope to allow pulling of future conductors intended for the specific raceway. Provide plastic wire-tie style nameplate tags on each end of pull rope with printed identification of conduit use and the location of the opposite end of the rope. Pull ropes for telecommunications service conduits shall meet the utility company requirements.
- B. Outlet Boxes and Junction Boxes. Verify all backbox requirements with devices to be installed prior to rough-in.
1. One piece steel knockout type drawn boxes, unless otherwise noted, sized as required for conditions at each outlet or as noted.
 2. Flush-mounted boxes equipped with galvanized steel raised covers for device mounting flush with finished surface. Provide extension rings as required on all acoustical or additional wall treatment areas to bring top of cover flush with finished surface (coordinate with architectural drawings). Devices shall be capable of being tightly mounted to boxes without distorting or bending device or mounting hardware.
 3. Boxes for fixture outlets: 4-inch octagon or larger as required, or as noted.
 4. Switch and receptacle outlets - not smaller than 4-inch-square in furred walls, with raised cover for single device; ganged where required.
 5. Outlet and switch boxes for wet locations, cast aluminum FS or FD type with cast aluminum gasketed spring lid cover. Weatherproof "Bell" type boxes are not acceptable.
 6. All connectors from conduit to junction or outlet boxes shall have insulated throats. Connectors shall be manufactured with insulated throats as integral part. Insertable insulated throats are unacceptable.
 7. Outlet boxes for telecommunications, 4" square or larger as required or noted, multi-ganged for voice, data, and other services where indicated on the drawings.
 8. Conduit Bodies: Malleable iron type, with lubricated spring steel clips over edge of conduit body, O-Z/Gedney type EW, or equal.
- C. Wire and Cable (line voltage and signal systems):
1. 600-volt class where used for or run with line voltage power wiring, insulation color coded, minimum No. 12 AWG for power branch circuits, No. 14 for power control circuits, and wiring size and type as directed by signal system manufacturer for each signal system.
 2. All conductors shall be copper.
 3. Size and insulation type:
 - a. Standard locations: #12 to #1 AWG: THWN for wet locations and THHN for dry locations. #1/0 through #4/0 AWG: XHHW (55 Mils). 250MCM and larger: XHHW (65 Mils). All wire sizes used shall be based on a 75

- degree insulation rating, unless specifically used with 90 degree rated breakers and devices.
- b. All wiring (power and signal) installed underground between buildings, or in wet or damp locations, shall be outside listed and rated for wet locations.
 - c. High temperature and non-standard locations: Provide wire type and insulation category suitable for area of use as defined in NEC table 310-13.
4. Conductors No. 8 and larger and as otherwise noted on drawings shall be stranded. Power conductors No. 12 and No. 10 shall be solid or stranded. Power conductors No. 14 or smaller shall be solid.
 5. Provide signal system wiring for each system to meet the system manufacturers requirements and recommendations for each device or equipment type. Signal wiring systems shall be provided with shielding and/or insulation type and cable quantities as directed by the manufacturer, and meet all NEC requirements for locations used.
 6. Install all wiring branch circuits and feeders (low voltage and line voltage) in conduit unless noted otherwise on the drawings. Contractor shall mandrel all feeders and pass a "sock" (or utilize other suitable means) through each raceway prior to pull to remove all water and construction debris. All raceways shall be completely clear of any obstructions or debris and all cut ends shall be reamed, prior to pull. Utilize pulling compound on all runs to insure minimum friction and pulling tension.
 7. Megger test all feeders prior to energizing. See section 26 08 00 for additional information.
 8. Approximately balance branch circuits about the neutral conductors in panels.
 9. Connections to devices from "thru-feed" branch circuit conductors to be made with pigtailed, with no interruption of the branch circuit conductors.
 10. Neutral conductor identified by white outer braid, with different tracers of "EZ" numbering tags used where more than one neutral conductor is contained in a single raceway.
 11. Neatly arrange and "marlin" wires in panels and distribution panelboards with "T and B Ty-rap" or approved equal plastic type strapping.
 12. All wire and cable shall bear the Underwriters' Label, brought to the job in unbroken packages; wire color-coded as follows:

a. Voltage	Phasing	A	B	C	N
b. 120/208	3PH4W	Black	Red	Blue	White
c. 2083PH	3W	Black	Red	Blue	--
 13. The equipment grounding conductor shall be insulated copper; where it is insulated, the insulation shall be colored green.
 14. Label each wire of each electrical system in each pull box, junction box, outlet box, terminal cabinet, and panelboard in which it appears with "EZ" numbering tags indicating the connected circuit numbers.
 15. Metal-clad cable, (MC) may be used in lieu of conduit and wire at concealed locations for final branch runs to devices on same circuit only. MC cable may not be used for multi-circuit branch circuit homeruns or feeders. Provide conduit and wire homeruns and feeders.
 - a. The conductors shall be soft drawn annealed copper, solid or stranded as stated above. Insulation shall be type THHN. Conductors shall be cabled with fillers, taped wrapped with overall seamless corrugated aluminum sheath.
 - b. Cables shall be 3 or 4 conductor type with parity sized ground wire.

- D. Switches: Model numbers are Hubbell, color to be selected by architect, unless otherwise noted. All switches to utilize screw terminals for wire connections - no plug-in terminations:
1. Single Pole - No. HBL1221
 2. Two Pole - No. HBL1222
 3. Three Way - No. HBL1223
 4. Momentary contact - No. HBL1557
 5. Momentary contact Keyed - No. HBL1556L
 6. Keyed, - No. HBL1221L
 7. Pilot Light (on with load on) - Hubbell No. 1221-PLC
 8. Motor Rated Double Pole (30A) - Hubbell No. 7832
 9. Motor Rated Three Pole (30A) - Hubbell No. 7810.
 10. Low voltage Data line switches - Refer to lighting control system (for compatibility)
- E. Receptacles: Mounting straps and contacts shall be one piece design, constructed of minimum .050" solid brass. Base shall be high strength, heat resistant, glass reinforced nylon. Device shall accept up to #10 wire, side or back wired with screw terminals - no plug-in terminations. Hubbell, Leviton, Pass & Seymore, or equal. Color to be selected by architect, unless otherwise noted. Numbers listed below are Hubbell:
1. 15A 3PG 125 volt duplex - No. HBL5262
 2. 20A 3PG 125 volt duplex - No. HBL5362
 3. 20A 3PG 125 volt ground fault interrupter receptacle; GFI receptacles shall conform to the 2006 UL requirements to a) interrupt power to the unit in the event of internal failure, or b) provide an audible or visual indication of internal failure of the GFI; No. GF20 or equal. Through wiring to down stream GFI designated receptacles is not acceptable.
 4. 15A 3PG 125 volt half controlled duplex receptacle - No. BR15C1(color), with permanent "controlled" marking, factory applied.
 5. 20A 3PG 125 volt half controlled duplex receptacle - No. BR20C1(color), with permanent "controlled" marking, factory applied.
 6. 15A 3PG 125 volt full controlled duplex receptacle - No. BR15C2(color), with permanent "controlled" marking, factory applied.
 7. 20A 3PG 125 volt full controlled duplex receptacle - No. BR20C2(color), with permanent "controlled" marking, factory applied.
 8. GFI Module (blank face), no indicator light, 20A - No. GFBF20 or equal.
 9. All receptacles located in exterior or wet locations shall be corrosion resistant with UV stabilized body.
- F. Plates: Leviton, or equal, except as noted:
1. The color of all faceplates shall match the color of the devices installed under/in the faceplate, except as specifically noted otherwise.
 2. For flush outlet boxes, for switches, and receptacles: nylon, color to be selected by architect, unless otherwise noted.
 3. Plates for surface-mounted outlets: galvanized steel unless otherwise noted.
 4. Plates for flush tele/data boxes: white nylon or as otherwise directed - provide and install at each tele/data outlet plate to match duplex power outlet plate, for jack installation. Where the power and tele/data outlet boxes are shared the plate shall be continuous in multi-gang locations. See drawings.
- G. Equipment Disconnects: All disconnects shall be located to allow proper code required clearance in each area. Locations shown on drawings are diagrammatic

only. The contractor shall coordinate exact locations in the field (with other trades) prior to rough-in to insure proper clearances.

1. Motor Disconnect Switches and Safety Switches: General Electric Company Heavy Duty Type "THD", cover interlocked with operating handle so that cover cannot be opened with switch in closed position and switch cannot be closed with cover in open position. 240V or 480V rating, single or multi-pole as required or as noted on drawings, in Nema 1 enclosure indoors or Nema 3R enclosure outdoors unless otherwise noted. Provide dual element motor circuit fuses sized as recommended by equipment manufacturer (for final equipment actually installed).
 2. Code required disconnects: Provide a local disconnect in addition to the branch circuit protection device for all equipment as required by code (whether shown or not). Disconnects shall consist of a motor rated switch (or disconnect) for all motor loads less than 3/4HP or other suitable disconnect sized to match branch circuit conductors and load current of equipment, with number of poles as required.
- H. Lugs and Connectors: Thomas and Betts "lock-tite", for No. 4 and larger wire; 3M "Scotchlock" fixed spring screw-on type wire connectors with insulator for No. 6 and smaller wire.
1. All splices shall be made up with screw-on type connectors - no plug-in or push-in style connectors acceptable. Wires shall be solidly twisted together with electricians pliers before screw-on connector is installed to ensure a proper connection in the event of wire nut failure. No exceptions.
 2. Connectors listed or labeled for "no wire twisting required" are not an acceptable substitute for actual wire twisting.
 3. Utilize porcelain type connectors in all high temperature environments (above 105 degrees Celsius).
- I. Splice Insulation: "Scotch" electrical tape with vinyl plastic backing or rubber tape with protective friction tape for interior work.
1. Splices in electrical cables of 600 volt insulation class in underground system duct shall be made only in accessible locations such as pullboxes, light pole handholes, etc., using a compression connector on the conductor and by insulating and waterproofing (for exterior and underground locations) by one of the following methods:
 - a. Cast type splice insulation shall be provided by means of a molded casting process employing a thermosetting epoxy resin insulating material which shall be applied by a gravity poured method or by a pressure injected method. The component materials of the resin insulation shall be in a packaged form ready for convenient mixing after removing from the package. Do not allow the cables to be removed until after the splicing material has completely set.
 - b. Gravity poured method shall employ materials and equipment contained in an approved commercial splicing kit which includes a mold suitable for the cables to be applied. When the mold is in place around the joined conductors, the resin mix shall be prepared and poured into the mold. Do not allow cables to be moved until after the splicing materials have completely set.
- J. Identification: Refer to Section 26 05 00.
- K. Firestopping: as manufactured by 3M Fire Protection Products or equal.
1. Fire-rated and smoke barrier construction: Maintain barrier and structural floor fire and smoke resistance ratings including resistance to cold smoke at all

penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound vibration absorption, and at other construction gaps.

2. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetration type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall penetrations. Systems or devices must be asbestos free.

PART 3 - EXECUTION

3.01 REFER TO BASIC ELECTRICAL REQUIREMENTS - SECTION 26 05 00 FOR WORK UNDER THIS SECTION.

3.02 TESTS

- A. Testing and Inspection: See Section 26 08 00 - Testing.

END OF SECTION

SECTION 26 51 01
LIGHTING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Luminaires (i.e., lighting fixtures): Refer to the Luminaire Schedule and provide a complete and working facility Lighting System. Catalog numbers in the Luminaire Schedule are design series references and may not represent the exact catalog number as specified or as required for particular installations. Provide complete luminaires to correspond with the number of LEDs, power supply, wattage, mounting hardware, ceiling type, trim, size, and special requirements as specified in the Luminaire Schedule for each luminaire type. Additional features, accessories, and options specified, described, scheduled, or necessary for installation shall be included.
- B. LEDs and power supplies.
- C. Lighting controls, including occupancy sensors. See Section 26 57 00 for Low Voltage Lighting Control System.
- D. Exit and Emergency Egress lighting where indicated and where required.
- E. Supports for outlet boxes and luminaires, including seismic restraint slack wires for recessed luminaires in suspended ceilings per code and backing in walls as required to keep luminaires secure and level.

1.02 INCORPORATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. Section 26 05 00 and 26 27 00 apply to all work in this section.
- C. Division 09: Painting and Finishes (cutting of holes in finished surfaces for recessed luminaires).

1.03 RELATED WORK

- A. Ceiling Access panels where required for access to equipment, outlets, transformers, etc., located above suspended ceilings, sheet rock or plaster ceilings. Coordinate with the Architect and other trades.

1.04 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 26 05 00.
- B. Submit (6) six sets of submittals for review by the project team unless otherwise noted in these specifications. The submittals shall include the following information:
 - 1. Product Index: The following information shall be included in the product index.
 - a. Luminaire Type. The index shall list, in alphabetical order, each luminaire type per the Luminaire Schedule.
 - b. Manufacturer's Catalog Number. Outstanding information required to make a complete catalog number shall be clearly identified in the index.
 - c. Where a pole is included with the luminaire, include the catalog number of the pole in addition to that of the luminaire.
 - d. LED Data. Provide the Manufacturer's name for each LED array including wattage, color temperature, lumen output, and color rendering index.
 - 2. Manufacturer's literature for every luminaire listed on the Luminaire Schedule.

- a. Catalog Information:
 - 1) Luminaire Data Sheet: The manufacturer's cut sheet shall include the following:
 - (a) Photometrics: Candlepower distribution curve or table with horizontal readings at 0, 22.5, 45, and 90 degrees and vertical readings from 0 to 180 degrees in 5 degree increments in accordance with the Illuminating Engineering Society published test procedures.
 - (b) Catalog Number Nomenclature
 - (c) Coefficient of Utilization Tables
 - (d) Luminaire Line Drawing
 - (e) Power supply (each type)
 3. Data sheets for electronic ballasts and power supplies. Indicate luminaire types on applicable ballast/power supply data sheets.
 4. Data sheets for wallbox controls and other products specified in this section.
 5. Shop Drawings:
 - a. Provide shop drawings of suspension details for luminaires recessed in, mounted on, or suspended from hung ceilings. Details shall clearly illustrate proposed methods for supporting luminaires independent of the suspended ceiling system.
 - b. Detailed shop drawings of all cove or box mounted luminaires containing the following information:
 - 1) Exact field measured length (clear inside dimension) of cove pocket or box.
 - 2) Exact luminaire length and arrangement of luminaires in cove or box.
 - c. Detailed shop drawings of pendant mounted luminaires constructed with linear metal housings containing the following information.
 - 1) Support mechanism, including swivel canopies.
 - 2) Trim details.
 - 3) Closure piece details.
 - 4) Pattern configurations.
- C. For Any Luminaires Substituted For Those Specified:
 1. Refer to Division 1 - Product Requirements, for all substitution procedures.
 2. Provide Independent Testing Laboratories, Inc., or equal, photometric test report for each Luminaire type and lamp combination listed on the Luminaire Schedule. Test reports shall be based on Illuminating Engineering Society published test procedures and shall contain polar coordinate candlepower distribution curves in five lateral planes for luminaires with asymmetric distributions and luminaire luminance data for vertical angles above 45 degrees from nadir. Test results shall indicate luminaire efficiency for the lamp and aperture assembly specified. luminaires with efficiencies more than 2% below the values of specified luminaires are not acceptable and will be rejected.
 3. Provide photometric calculations for each room or area where a substituted luminaire is proposed. Such calculations shall be made using comprehensive lighting software, such as AGi32, and include point-by-point illuminance values at IES recommended heights, average illuminance, and maximum-to-minimum and average-to-minimum uniformity ratios. Room dimensions, configurations (including sloping ceilings), room surface reflectances, light loss factors, and heights of suspended luminaires shall match the heights specified in the contract documents.

4. Due to the variety of lumen outputs and light distributions of LED Luminaires, substitutions will require additional review on the part of the Engineer or Architect to ascertain the equivalency of the substituted luminaires. Substitutions will be reviewed to determine their aesthetic, construction, and photometric equivalency to maintain similar design impact and performance in their intended environment. The Engineer and Architect have not included such unknown and unquantifiable review time in their scope of work and are not compensated by the Owner for such services. The Contractor shall reimburse the Engineer and Architect for labor costs to review substitutions.
5. Prior approval does not guarantee final approval by the Engineer. The Contractor shall be responsible for providing luminaires that meet or exceed the quality and performance of the specified products in their entirety. All deviations in quality and performance from the specified products must be listed and individually signed off by the engineer.
6. The Owner reserves the right to reject a proposed substitution based on their agent's professional judgment as to the utility, quality, performance, visual appropriateness, or finish of substitutions.

1.05 OCCUPANCY SENSORS

A. Equipment Qualification

1. Wall switch products must be capable of withstanding the effects of inrush current. Submittals shall clearly indicate the method used.
2. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.
3. Contractor and Contractor's Supplier shall examine all general specification provisions and drawings for related electrical work required as work under Division 26.
4. Contractor shall coordinate all work described in this section with all other applicable plans and specifications, including but not limited to wiring, conduit, luminaires, HVAC systems and building management systems.

1.06 DELIVERY, STORAGE, AND HANDLING

- ##### A. Deliver products to site and store in unopened cartons in protected location. Inspect products immediately and report all damage accordingly.

1.07 GUARANTEE AND WARRANTIES

- ##### A. All work performed under this section must be guaranteed to be free of defects in products or workmanship for one year after date of acceptance by Owner, unless noted otherwise in General Conditions.
- ##### B. Warranties:
1. Electronic power supplies must be warranted against failure for at least five years after date of substantial completion.

PART 2 - PRODUCTS

2.01 GENERAL

- ##### A. Provide luminaires as indicated in Luminaire Schedule; if conflict exists between Luminaire Schedule and Specifications, the more stringent requirement shall take precedence.
- ##### B. Provide luminaires new and complete with mounting accessories, junction boxes, trims, and lamps.

- C. Provide products with UL labels appropriate to intended installation conditions, or with labels from other testing laboratories whose results are acceptable to local inspector, showing compliance with UL standards. Labels must be concealed from normal viewing angles.
- D. All products of same type by same manufacturer.

2.02 SOLID STATE LUMINAIRES

- A. Housing, where applicable:
 - 1. Steel bonderized or equal rust protected, or aluminum, rigid construction. Minimum gauge thickness shall be as follows:
 - a. Interior locations: No. 20-gauge steel, No. 16-gauge aluminum.
- B. Finish:
 - 1. Baked enamel finish (except when otherwise specified).
 - a. Concealed interior surfaces (this applies to interior hardware, circuit boards, etc.) matte black.
 - b. Concealed exterior surfaces: matte black.
 - c. Visible surfaces: color and texture as specified below for each luminaire type or as selected.
- C. Light Emitting Diode (LED) requirements:
 - 1. Correlated color temperature (CCT) for phosphor-coated white LEDs must have one of the following designated CCTs, as specified on the Luminaire Schedule, and fall within the following binning standards.
 - a. 3000K defined as 3045 +/- 175K
 - 2. Color spatial uniformity shall be limited to variations in chromaticity for different directions (i.e. changes in viewing angle) within 0.004 from the weighted average point on the CIE 1976 (u',v') diagram.
 - 3. Color maintenance shall be limited to a maximum change in chromaticity of 0.007 on the CIE 1976 (u',v') diagram over the lifetime of the product.
 - a. Color rendering index: Color rendering index to be determined using ANSI C78.377-2008 and applicable IESNA standards.
 - b. Laboratory tests must be produced using specific module(s)/array(s) and power supply combination that will be used in production.
 - c. Manufacturers must provide a test report from a laboratory accredited by NVLAP or one of its MRA signatories
 - 4. Lumen depreciation
 - a. Lumen depreciation to be measured using IESNA LM-80-08 and TM-21-11 standard for IES approved method of measuring lumen maintenance of LED light sources.
 - b. Phosphor-coated white LED modules/arrays shall deliver at least 70% of initial lumens for a minimum of 50,000 hours when installed in-situ and operated at 100% output and the maximum specified operating temperature.
 - c. Colored LED modules/arrays shall deliver at least 50% of initial lumens for a minimum of 50,000 hours when installed in-situ and operated at 100% output and the maximum specified operating temperature.
 - 5. Acceptable LED manufacturers:
 - a. Cree
 - b. Nichia
 - c. Osram Opto Semiconductors
 - d. Philips Lumileds
 - e. Xicato

- D. Luminaire Efficacy:
1. Luminaire efficiency shall be measured using IESNA LM-79-08 standard for electrical and photometric measurements of solid state lighting products.
 2. Manufacturer shall provide published luminaire efficacy, which is defined as luminaire light output divided by luminaire input power measured in a 25 degree Celsius environment. Efficacy shall include power supply, thermal, optical, and luminaire losses.
- E. Thermal Management:
1. Solid state luminaire shall not exceed LED manufacturer's maximum junction temperature requirements when operated in-situ at luminaire manufacturer's maximum ambient operating temperature and 100% light output.
 2. Solid state luminaires shall be thermally protected using one or more of the following thermal management techniques:
 - a. Metal core board
 - b. Gap pad
 - c. Internal monitoring firmware
 3. Solid state luminaire housing shall be designed to transfer heat from the LED board to the outside environment.
- F. Power Supplies (LED Drivers) requirements:
1. Power factor of 0.90 or greater for primary application
 2. Input current shall have Total Harmonic Distortion (THD) of less than 20%.
 3. Minimum operating temperature of minus 20 degrees Celsius or below when used in luminaires intended for outdoor applications.
 4. Operating frequency equal to or greater than 120 Hz.
 5. Operate with sustained input variations of +/- 10% (voltage and frequency) with no damage to the driver.
 6. Tolerate sustained open circuit and short circuit output conditions without damage and without need for external fuses or trip devices.
 7. Output shall be regulated to +/- 5% across published load range.
 8. Class A sound rating.
 9. Outputs shall have current limiting protection.
 10. Operate LEDs at constant and regulated current levels. LEDs shall not be overdriven beyond the diode manufacturer's specified nominal voltage and current.
 11. Inrush currents not exceeding peak currents specified in NEMA 410.
- G. Solid State Lighting Controls:
1. Control interface to dimmable power supplies shall consist of one of the following:
 - a. Line Voltage Dimming. Controls to be rated for magnetic or electronic low voltage transformer operation.
 - b. Low voltage (0-10V) control. Controls to be compatible with either current sink or current source operation.
 2. Dimmable LED power supplies shall use pulse width modulation (PWM) or constant current reduction (CCR) to regulate power to LEDs.
 - a. PWM power supplies shall have 12-bit or greater resolution to obtain flicker-free operation throughout their dimming range.
 - b. PWM power supplies shall be provided in luminaires that will be dimmed lower than 40% and must maintain consistent color temperature.
 - c. CCR power supplies shall be provided in areas that have strict electromagnetic interference (EMI) requirements, high motion activity, or rotating machinery.

H. System Installation

1. Hardwired connections to solid state luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
2. All solid state luminaires (100% of each lot) shall undergo a minimum eight-hour burn-in test during manufacturing. Solid state lighting installations shall be UL Listed as a low-voltage lighting system including, but not limited to, luminaire, power supply, controller, keypad, and wiring.

I. Warranty

1. Luminaires, drivers, and controllers for solid state lighting systems shall be covered by a five-year warranty against defects in workmanship or material. Warranty shall include in-warranty service program providing for payment of authorized labor charges incurred in replacement of inoperative in-warranty equipment.

2.03 LUMINAIRE CONSTRUCTION

- A. Sheet metal: materials and thicknesses shall be 20 gauge (0.7 mm or 0.027") min., free of dents, scratches, oil-can, or other defects.
- B. Painted luminaires: exposed weld marks, joints, and seams shall be filled and sanded smooth before finishing.
- C. All edges cleaned and dressed to remove sharp edges or burrs.
- D. Extrusions: 1/10" min. wall thickness, smooth and free of tooling lines, with cast end plates that exactly match extrusion profiles.
- E. Castings: smooth, free of pits, scales, gate marks, or blemishes.
- F. Spinings shall have 1/32" min. thickness, smooth, free of spinning lines or blow-back, with clean edges.
- G. Welds: Follow recommendations of American Welding Society. All welds continuous and free of spatter, residue, or warping.
- H. No light leaks visible in finished room. Ensure that downlight housings mounted in wood slat ceilings are not visible from below. Field paint exterior of housing with high temperature paint if necessary.
- I. Exposed end plates and joiners, with concealed fasteners.
- J. End-to-end mounted luminaires: Verify row configurations and provide joiners, aligning splines, and trims to suit.
- K. Hardware:
 1. Steel or aluminum interior luminaires: cadmium-plated hardware.
 2. Steel or aluminum exterior luminaires: stainless steel hardware.
 3. Stainless steel luminaires: stainless steel hardware.
 4. Copper alloy luminaires: brass hardware.
- L. Raceways: Where used for through wiring, luminaires must be approved for use as raceways.

2.04 RECESSED LUMINAIRES

- A. Point-source luminaires: provide pre-wired junction box and thermal protection, and provide slack wires to structure at two diagonal corners.
- B. Troffer luminaires: provide hold-down clip at each luminaire corner, and slack wires to structure as detailed on the drawings. The detail will take precedence.
- C. Verify ceiling construction details and provide luminaire housings and trims to suit.

- D. Non-accessible ceilings: Provide access to junction boxes, ballasts, transformers, and battery packs through luminaire apertures; no access panels in ceiling.
- E. Mounting frames: To prevent rusting, provide galvanized steel or cast aluminum frames for installation in damp locations or in plaster ceilings.
- F. Adjustable luminaires shall be provided with rotation and tilt locking devices.

2.05 PENDANTS

- A. Stem-mounted: 16 mm (5/8") max. o.d. stem with ball swivels at top (and bottom of linear luminaires) to permit 45 degree swing in any direction from vertical. Flat canopy to permit splice inspection after installation. Pendants must permit +/- 13 mm (1/2") threaded vertical adjustment after installation, leaving at least 6 mm (1/4") thread contact at all points.
- B. Provide internal safety cable from luminaire body to stud in outlet box.
- C. Cable-mounted: 1 X 7 strand 3/32" diameter stainless steel aircraft cable, factory crimped, independently tested and verified to exceed 1500 pounds.
 - 1. Verify mounting heights for each luminaire and provide cable lengths and coordinate cord lengths with manufacturer as required prior to ordering luminaires. Provide aircraft cable adjuster nipple with locking jaws.
- D. Supports: Carry luminaire weight to structure and provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting. Provide diagonal seismic restraint wires per code.

2.06 TRIMS

- A. Trims must fit tightly and be held in by gravity, spring clips, or mechanical fasteners. Trims must not drop out under normal conditions or seismic forces which do not exceed the design criteria of the building.
- B. Aluminum parabolic cones shall be smooth, properly shaped, with Alzak finish in colors as indicated.
 - 1. No hot spots or lamp images visible at angles shallower than lamp shielding angle.
 - 2. Self-flange cones must bend parallel to ceiling and cover ceiling hole without additional trim ring. Unpainted flange, shall have the same finish as cone interior.
 - 3. Cones and louvers for fluorescent luminaires must have permanent anti-iridescence treatment.
- C. Lenses, diffusers, and patterned glass: glass or virgin acrylic as noted, with patterns as noted.
 - 1. Finished thickness 2 mm (1/10") min. unless noted otherwise.
 - 2. Linear runs over 1200 mm (4'-0") long shall be in equal-length pieces.

2.07 FINISHES

- A. Steel Reflectors: Unless otherwise specified, the reflector surface finish shall be of synthetic white enamel or polyester powder coating. Finish shall show no indication of chipping, cracking, flaking or any other sign of loss of adhesion. The initial reflection factor shall be not less than 88 percent averaging 5 randomly selected points on the reflector. After 100 hours of exposure to the radiation of a glass enclosed carbon arc lamp, such as a Fade-O-Meters, the reflectance of the exposed portion shall not be less than 5 percent and finish shall show no appreciable color change. The carbon arc lamp shall be operated at appreciable color change. The carbon arc lamp shall be operated at 13 plus or minus 0.5 amperes at 140 volts.

The reflector shall be placed ten inches from the arc and the lamp so ventilated that the temperature of the exposed portion does not exceed 105 degrees F.

- B. Aluminum Reflectors: Reflecting surfaces shall be provided with either a specular or diffuse finish as indicated. Reflection factors shall be not less than 83 percent for specular reflecting surfaces. Each reflecting surface shall be protected by dense coating of oxide weighing not less than 5.0 milligrams per square inch, applied by an anodic process. The reflector shall be given a sealing treatment that will prevent staining of the reflecting surface when subjected to a stain test. All aluminum reflectors & louvers shall be a low iridescent equivalent to that provided by Coil Anodizers.
- C. Non-Reflecting Surfaces: Unless otherwise specified, the finish on all non-reflecting exterior surfaces shall be aluminum oxide or aluminum; white, gray or aluminum paint on steel; nickel or chromium plating on copper alloy. Fastening devices shall be nickel, chromium, cadmium or zinc plated. All painted surfaces shall be free of tears, star marks, blisters, pinholes, chipping and any other defects that may impair appearance or serviceability.

2.08 LAMPS

- A. Relamp luminaires or replace LED boards and power supplies at no cost to owner if lamps or LEDs exhibit color variation, flicker, or burn out within 90 days of substantial completion date.
- B. LEDs:
 - 1. LED quantity, wattage, and color temperature as specified for each LED luminaire.
 - 2. 3500 deg. K color temperature for interior luminaires, 3000 deg. K for exterior luminaires, unless otherwise specified.

2.09 DRIVERS AND TRANSFORMERS

- A. General:
 - 1. Verify input voltages and match to branch circuit voltages.
 - 2. Remote drivers or transformers: Provide suitable enclosures and mounting hardware, and install in accessible, ventilated locations.
 - a. Secondary wiring: provide number and size of conductors as required, with 3% max. voltage drop between transformer and last lamp.
 - b. Keep transformers at least 300 mm (12") apart and do not stack vertically.
- B. LED Drivers:
 - 1. High power factor, thermally-protected.
 - 2. Compatible with LED lamps being used.
 - 3. Capable of dimming LED source without perceptible flicker or stroboscopic effects.

2.10 EMERGENCY LIGHTING AND EXIT SIGNS

- A. Emergency lighting:
 - 1. Provide lighting for paths of egress as required by Code.
- B. Emergency lighting to consist of wall or ceiling mounted (normally off) lamp head units with battery back-up for 90 minutes of egress lighting output.
- C. Description of Systems:
 - 1. Auxiliary battery packs mounted integral to luminaires shall provide no less than 1400 lumen output for a minimum of 90 minutes.
 - 2. Surface mounted luminaire with two (2) reflector-type LED lamps on emergency battery with 90 minute operation.

- D. Auxiliary Battery Pack/Ballasts for LED Luminaires:
1. Pure lead or nickel-cadmium, sealed and maintenance-free.
 2. Automatic transfer to battery power if supply voltage drops below 75% of normal.
 3. Must provide at least 87-1/2% or rated battery voltage for 90 minutes minimum.
 4. Internal circuitry to provide continuous "trickle" charge and to prevent deep discharge below 80% of rated battery voltage.
 5. Full recharge within 24 hours after restoration of normal power.
 6. Charge indicator light visible and test switch operable without tools.
 7. Concealed inside luminaire or above ceiling, but replaceable through luminaire aperture.
 8. Designed to run one or two lamps per luminaire with minimum of 1400 lumen output.
 9. Acceptable manufacturers: Bodine, Dual-Lite, Emergi-Lite, Lithonia, Radiant, Siltron.
- E. Exit signs shall be edge or back lit LED, surface-mounted on ceiling or wall, with integral battery packs as described above.
1. Fabricated aluminum construction, no light leaks around canopy. Plain box, with no decorative trim.
 2. Letters shall be 20mm (3/4") stroke, 150 mm (6") high, with concealed knockouts for left or right arrows, brightness and evenness of illumination per code, green color.
 - a. Battery pack contained in basic luminaire housing. No add-on packs or canopies.
 - b. Green LED lamps located at interior perimeter for indirect illumination of stencil letters.
 - c. Provide finish as specified in the Luminaire Schedule.
 - d. Knock out the arrows as indicated on the plans.

2.11 OCCUPANCY SENSORS

- A. General
1. Wall switch sensors shall be capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet.
 2. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180° coverage capability.
 3. Wall switch products shall utilize Zero Crossing Circuitry which increases relay life, protects from the effects of inrush current, and increases sensor's longevity.
 4. Wall switch sensors shall have no leakage current to load, in manual or in Auto/Off mode for safety purposes and shall have voltage drop protection.
 5. Where specified, wall switch sensors shall provide a field selectable option to convert sensor operation from automatic-ON to manual-ON.
 6. Where specified, vandal resistant wall switch sensors shall utilize a hard lens with a minimum 1.0mm thickness. Products utilizing a soft lens will not be considered.
 7. Passive infrared sensors shall utilize Pulse Count Processing and Digital Signature Analysis to respond only to those signals caused by human motion.
 8. Passive infrared sensors shall utilize mixed signal ASIC which provides high immunity to false triggering from RFI (hand-held radios) and EMI (electrical noise on the line), superior performance, and greater reliability.

9. Passive infrared sensors shall have a multiple segmented Lodif Fresnel lens, in a multiple-tier configuration, with grooves-in to eliminate dust and residue build-up.
 10. Where specified, passive infrared and dual technology sensors shall offer daylighting foot-candle adjustment control and be able to accommodate dual level lighting.
 11. Dual technology sensors shall be corner mounted to avoid detection outside the controlled area when doors are left open.
 12. Dual technology sensors shall consist of passive infrared and ultrasonic technologies for occupancy detection. Products that react to noise or ambient sound shall not be considered.
 13. Ultrasonic sensors shall utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.
 14. Ultrasonic operating frequency shall be crystal controlled at 25 kHz within $\pm 0.005\%$ tolerance, 32 kHz within $\pm 0.002\%$ tolerance, or 40 kHz $\pm 0.002\%$ tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.
 15. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.
 16. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
 17. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
 18. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.
 19. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.
 20. Where specified, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed and Common outputs for use with HVAC control, Data Logging and other control options. Sensors utilizing separate components or specially modified units to achieve this function are not acceptable.
 21. All sensors shall have UL rated, 94V-0 plastic enclosures.
- B. Circuit Control Hardware - CU
1. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.
 2. Relay Contacts shall have ratings of:
 - a. 13A - 120 VAC Tungsten
 - b. 20A - 120 VAC Ballast
 - c. 20A - 277 VAC Ballast
 3. Control wiring between sensors and controls units shall be Class II, 18-24 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.

4. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.
- C. Acceptable Manufacturers
 1. The Watt Stopper, or Pre-Approved Equal: For pre-approval, provide all the information listed under "submittals" a minimum of ten (10) working days prior to initial bid date.
 2. The listing of any manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the Contractor to ensure that any price quotations received and submittals made are for sensors that meet or exceed the specifications and the requirements of the contract documents.
 3. Products
 - a. All products shall be Watt Stopper product numbers:
 - 1) Ceiling sensors: WT-605, WT-600, WT-1105, WT-1100, WT-2205, WT-2200, WT-2250, WT-2255, W-500A, W-1000A, W-2000A, W-2000H, WPIR, DT-200, DT-205, CX-100, CX-105, CI-200, CI-205
 - 2) Wall sensors: WI-200, WS-120/277, WA-100, WD-170, WD-180, WD-270, WD-280
 - 3) Power and Slave Packs: B120E-P, B277E-P, C120E-P, C277E-P, S120/277-P, AT-120, AT-277

PART 3 - EXECUTION

3.01 PREPARATION

- A. Architectural Reflected Ceiling Plans and Elevations shall govern exact location and mounting conditions for all luminaires. Contractor shall coordinate luminaire mounting and compatibility with ceiling construction and other trades.
- B. Coordinate work with other trades. Location of lighting has priority over location of new framing (except major structural members), ducts, diffusers, sprinklers, speakers, smoke detectors, and other obstructions.
- C. If obstructions are encountered which prevent installation of luminaires according to drawings, notify Architect immediately and do not proceed until conflict has been resolved.
- D. Coordinate the location of luminaires in mechanical or unfinished spaces. Locations shown on Drawings may be adjusted by the Contractor to suit conditions. Install luminaires to avoid obstructions and maximize light output, 2100 mm (7'-0") min. mounting height.
- E. In Elevator Machine Rooms, locate the luminaires so that the illumination level at the floor is not less than 200 lx (19 fc). Illuminate areas in front of and behind (if accessible) controllers, machines and other elevator equipment.
- F. In Elevator Pits, locate the luminaires so that the illumination level at the pit floor is not less than 100 lx (10 fc).
- G. Coordinate the location of any exposed conduit used to feed luminaires with the Architect prior to installation.

3.02 INSTALLATION

- A. General:
 1. Contractor shall be responsible for handling and installation of luminaires including all supports, hangers and hardware necessary for a complete installation. Luminaires shall be clean, plumb, level in straight lines, without distortion. Luminaires must be installed so they do not shift during relamping or adjustment. Remedy any light leaks which may develop after installation of recessed or enclosed luminaires.

2. Install luminaires at locations and heights as indicated, in accordance with luminaire manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that luminaires fulfill requirements.
 3. Point-source luminaires shall be located as dimensioned, or in center of tile or on tile joint as drawn; 6 mm (1/4") max. off-center tolerance.
 4. Linear luminaires shall have 3 mm (1/8") max. horizontal or vertical alignment variation in any 5 m (16-ft.) portion of run.
 5. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds. 486 A and B, and the National Electrical Code.
 6. Clean luminaires of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses.
 7. Remove and replace luminaires that may have been damaged during construction at no additional cost to the Owner.
 8. Protect installed luminaires from damage during remainder of construction period.
 9. Provide equipment grounding connections for luminaires as indicated. Tighten connections to comply with tightening torques specified in UL 486 A to assure permanent and effective grounds.
 10. Install luminaires, lamps, lenses, etc., after building is enclosed, weather tight and environmental conditions are nominally the same as expected for the complete spaces. All lenses, glass, reflectors, and refractors shall be clean and free of chips, cracks, and scratches.
 11. All wall mounted luminaires and all ceiling mounted surface luminaires including exit lights shall be fed through a luminaire Stud/Hickey/Nipple assembly and with provisions to prevent luminaire turning.
 12. Installation of exit signs shall be coordinated with other trades to ensure signs are visible as intended.
 13. All junction box cover plates for the lighting branch circuit system shall be clearly marked with a permanent ink felt pen identifying the branch circuit and control relay (panel number, circuit number, lighting control cabinet designation and control relay number) contained in the box.
 14. Provide permanently affixed adhesive labels with machine printed lettering (min. 1/8" high) at junction boxes serving luminaires that are supplied by (2) electrical sources (i.e. normal and emergency lighting). Label to read "CAUTION - This luminaire is powered by (2) separate sources. The normal power source breaker and the emergency power source breaker must be turned off before servicing this luminaire."
- B. Recessed Luminaires:
1. The contractor shall verify the fire rating of the ceiling system and wall in which the luminaires are to be mounted. Where luminaires are installed in fire rated ceilings or walls, provide fire rated enclosures around and over luminaires to maintain ceiling fire rating. No additional cost shall be allowed for failure to include such enclosures and installation in the bid.
 2. Holes for Recessed Point-Source Luminaires: Cut holes to follow luminaire housings exactly so no gaps will be visible after trims are installed.
 3. Install bottom of housing aligned with finished ceiling.

4. Keep ceiling insulation at least 75 mm (3") away from luminaires. Exception: luminaires with insulated contact (IC) rating shall be permitted to be in contact with insulation.
 5. Install trims after painting of spaces. Install trims tightly, with no gaps or light leaks.
 6. Seismic restraints: Provide and install slack wires and hold-down clips per code.
 7. Wallwashers:
 - a. Orient wallwasher housings according to manufacturer's instructions to maximize brightness on the upper portion of the wall.
- C. Ceiling-Mounted and Pendant Luminaires:
1. Provide support for outlet boxes and suspension points so luminaires can be installed securely, including seismic supports per code.
 - a. Luminaire weight less than 23 kg (50 lb) at each suspension point: hang from strap or stud on outlet box, or at non-feed points, provide 1/4"-20 stud projecting 20 mm (3/4") below ceiling.
 - b. Luminaire weight 23 kg (50 lb) or more at each suspension point: hang directly from structure, either independent of outlet box or from stud extending through outlet box to structure, unless the outlet box is listed for not less than the weight to be supported. Boxes used as the sole support of luminaires weighing more than 50 pounds must be listed and marked by the manufacturer with the maximum weight.
 2. Pendants:
 - a. Provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting.
 - b. Provide diagonal seismic restraint wires above ceiling per code.
 - c. Furnish suspended luminaires with universal joint type hanger canopy (and longitudinal sway adapter at each stem connection point for linear luminaires), to permit 45 degree swivel on 360 degree circle from Nadir at canopy (and 45 degree longitudinal movement at sway adapter).
 - d. Luminaires over 450 mm (18") wide shall be provided with supports at all corners.
 - e. Install pendants plumb and level.
 - f. Verify luminaire weights and provide backing in ceiling as required.
- D. Wall-Mounted Luminaires:
1. Mounting heights shown on Drawings are measured from finished floor to centerline of outlet box or recessed housing, unless otherwise noted.
 2. Verify luminaire weights and provide backing in wall as required. Luminaires must not droop or tilt away from wall.
 3. Wet locations: install sealant between luminaire and outlet box.
 4. In circulation areas, wall-mounted luminaires must not project more than 100 mm (4") from wall if mounted above 685 mm (27") and below 2030 mm (80").

3.03 LIGHTING CONTROLS

- A. Install controls so that all operable parts are at 48 inches (1220 mm) maximum height.
- B. Lighting controls to include occupancy sensors in most spaces (for local control) and relay system lighting control for larger common spaces as indicated on the drawings.
- C. Occupancy sensors shall initially be set as follows:

1. Maximum sensitivity.
 2. Maximum time delay (or 30 minutes).
 3. Manual-on operation.
 4. Automatic off operation.
 5. Aim all adjustable sensors to properly cover room areas.
- D. Timeclock System shall initially be set to control the low voltage relays as per the Relay Panel Schedule LCP.
1. Assign all interior relays to an automatic off sweep, with flick warn (except those noted as "NL"). Off time shall be set to an Owner-determined time in the evening, after dark or normal business operations.
 2. Off signals to may originate from BAS system, which shall be inter-connected to the Lighting Control System where indicated on the drawings.
 3. Assign all interior relays noted as "NL" to be on 24 hours per day. No automatic relay operation.
 4. Assign "after hours" and "Weekend / Holiday" hours to match normal business calendar and times.
 5. All interior relays shall be allowed to be overridden by use of the local dataline switches for a maximum of 2 hours (per Title 24) when used after hours or on Weekends / Holidays. If used during these times, automatic shut-off shall re-activate at the end of the 2-hour period.
 6. All interior relays shall be allowed to be overridden by use of the local dataline switches when used during normal business hours. Standard timeclock operation shall resume with the next scheduled timeclock function for each relay.
 7. Assign all exterior relays for automatic on operation with the astro-dial feature, set to 30 minutes before sunset. Latitude = 37.5 degrees North / Longitude = 122 degrees West.
 8. Assign exterior relays noted as "astro-on, astro-off" for automatic off operation with the astro-dial feature, set to 30 minutes after sunrise. Latitude and Longitude as noted above.
 9. Assign exterior relays noted as "astro-on, timeclock-off" for automatic off operation with the normal timeclock feature, set to an owner determined time in the late evening.
 10. Assign exterior relays noted as "NL" or "On All Night" for astro-dial operation, for automatic on 30 minutes before sunset and automatic off 30 minutes after sunrise.

3.04 DELIVERY, STORAGE, & HANDLING:

- A. Deliver luminaires in factory-fabricated containers or wrappings, which properly protect luminaires from damage. Inspect luminaires immediately upon delivery to ensure correct shipment without damage.
- B. Store luminaires in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground.
- C. Handle luminaires carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new. Protection wrapping on louvered (parabolic) luminaires shall not be removed until luminaires are ready for operation.

3.05 SEQUENCING AND SCHEDULING:

- A. General:

1. Coordinate with other work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of luminaires with other work.
2. Sequence lighting installation with other work to minimize possibility of damage and soiling during remainder of construction.

3.06 PROJECT CLOSEOUT

- A. Clean luminaires and remove plaster and paint spatters.
- B. Clean fingerprints and dust from downlight reflectors. Refer to manufacturer's instructions.
- C. Verify that luminaires and controls are working at time of final acceptance by Owner.
 1. Repair or replace lighting control devices that are inoperable.
 2. Repair or replace LED modules or entire LED luminaires that are inoperable.
 3. Repairs and/or replacements shall be at no additional cost to the Owner.
- D. Test emergency lighting system for 90 minutes in presence of Owner's representative, check each luminaire for proper operation at end of 90-minute test, then recharge for 24 hours and briefly test each luminaire again for proper operation.
- E. Install and aim adjustable lighting as directed by Architect.
 1. Provide personnel, lifts, ladders, and walkie-talkies as required.
 2. Aiming will occur at night, outside of normal working hours, at times as approved by the Architect.
- F. Prepare two copies of a Lighting Systems Maintenance Manual consisting of the following in a hardcover binder. Deliver to Architect. After review, Architect will deliver one copy to Owner.
 1. One complete set of approved submittals, including product data and shop drawings.
 2. Luminaire cleaning instructions, including chemicals to be used or avoided.
 3. Instructions for code-required testing and maintenance of emergency lighting system.

END OF SECTION

SECTION 31 10 00 – SITE CLEARING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specifications for clearing, grubbing and disposing of vegetation, including bushes, brush, trees, stumps, fallen timber, logs, roots, rubbish, refuse trash, and debris within the indicated site limits.
- B. Protection from injury or defacement of trees and other vegetation and objects indicated to be preserved.
- C. Removal, salvage, or other disposition of slabs, footings and foundations; existing pavement, curbs and gutters, sidewalks, headwalls, walls, and steps; utility service facilities; guardrail and posts, highway and street signs and fences; and other miscellaneous structures and site improvements which interfere with construction.

1.02 RELATED REQUIREMENTS

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

1.03 REFERENCE STANDARDS

- A. California Code of Regulations, Title 8, Chapter 4, Subchapter 4 - Construction Safety Orders
- B. California Code of Regulations, Title 24, Part 2, California Building Code, Chapter 33, Site Work, Demolition and Construction
- C. State of California, Department of Transportation (Caltrans), Standard Specifications, Latest Edition

1.04 JOBSITE CONDITIONS

- A. Stockpile salvaged material in a secured location.
- B. Clear and restore areas used for the Contractor's convenience. Restore such areas to their original condition, and provide mulching, seeding and planting as required.
- C. Protect survey markers and monuments, existing improvements, and adjacent properties from removal and damage.
- D. Give written notices to utility companies and municipal departments requesting discontinuance of services to areas which will be affected by the site preparation work.

1.05 CARE OF EXISTING TREES

- A. Trees and plants indicated on the Contract Drawings to remain and to be preserved shall be protected from damage by constructing suitable barriers or fences at, or near, the driplines

of the trees and plants. Vehicles, equipment, materials, and debris shall not be placed or parked in these areas or under trees to remain.

- B. Feed, water, and maintain protected trees and plants in a healthy, growing condition during the construction period.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Furnish all materials, tools, equipment, facilities, and services as required for performing site clearing and preparation work.

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

- A. Perform clearing and grubbing as necessary to remove vegetation and objectionable material from the site. Clear the site within the limits indicated, and remove cleared materials and debris from the site.
- B. Remove stumps and roots completely in excavation areas and under embankments where the original ground level is within 3.5 feet of subgrade or slope of embankments. In embankment areas, where the original ground level is more that 3.5 feet below the subgrade or slope of embankment, cut off trees, stumps, and brush to within six inches of the ground.
- C. Do not start earthwork operations in areas where clearing and grubbing are not complete, except that stumps and large roots may be removed concurrently with excavation.
- D. Where the work includes requirements for wood chip mulch, acceptable material from clearing and grubbing activities may be used to produce such mulch.

3.02 TREE BRANCHES

- A. Remove tree branches overhanging trackways, roadways, and other designated areas of the site to within 10 feet of finish grade. Cut off branches neatly and close to the tree boles. Remove other branches as necessary to present a balanced appearance. Treat scars resulting from tree branch removal with a heavy coat of an approved asphaltic tree paint.

3.03 REMOVAL

- A. Remove existing pavements, structures, and site improvements which interfere with construction, where demolition is not indicated.
- B. Remove walls and masonry construction to a minimum depth of two feet below existing ground level in areas where such items do not interfere with construction.
- C. Slabs may be broken for drainage and left in place where they are not detrimental to the structural integrity of the fill or structure to be placed above.

3.04 DISPOSAL OF REMOVED MATERIALS AND DEBRIS

- A. Dispose of removed materials, waste, trash, and debris in a safe, acceptable manner, in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction.
- B. Burying of trash and debris on the site will not be permitted. Burning of trash and debris at the site will not be permitted.
- C. Remove trash and debris from the site at frequent intervals so that its presence will not delay the progress of the work.
- D. Removed materials, waste, trash, and debris shall become the property of the Contractor and shall be removed from the District's property and disposed of in a legal manner. Location of disposal site and length of haul shall be the Contractor's responsibility.

3.05 SALVAGE

- A. Items or materials to be salvaged are indicated on the Contract Drawings and in the Contract Specifications.
- B. Protect metallic coatings on salvaged items. Remove adhering concrete from salvaged items.
- C. Repair, or replace with new material, salvaged material damaged or destroyed due to Contractor's negligence.

END OF SECTION

SECTION 31 20 00 – EARTHWORK**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specifications for the excavation, filling, re-compacting, grading and disposal of excess material.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 31 23 19 – Dewatering
- C. Section 31 23 33 – Trenching and Backfilling
- D. Section 32 11 23 – Aggregate Base

1.03 REFERENCE STANDARDS

- A. ASTM C136-84a – Standard Method for Sieve Analysis of Fine and Coarse Aggregate
- B. ASTM D1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort
- C. ASTM D2922 – Density of Soil and Soil-Aggregate in Place by Nuclear Methods
- D. State of California, Department of Transportation (Caltrans), Standard Specifications, Latest Edition

1.04 DEFINITIONS

- A. Compaction
 - 1. The degree of compaction is specified as percent compaction. Maximum densities refer to the maximum laboratory dry soil densities obtainable at optimum moisture content as determined by ASTM D1557.
 - 2. Percent compaction (relative compaction) is the ratio of the measured field dry density to the laboratory maximum dry density.
- B. Excavation Slope: Excavation slope shall be defined as an inclined surface formed by removing material from below existing grade.

1.05 SUBMITTALS

- A. Product Data
 - 1. Fill Materials.
 - 2. Source of concrete and aggregate for approval.

B. Test Reports

1. Gradation (ASTM C136).
2. Density-In-Place (ASTM D2922).

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Class 2 Aggregate Base

1. Class 2 aggregate base for subsequent backfill and/or pavement base to be $\frac{3}{4}$ inches maximum Class 2 aggregate base conforming to Caltrans, Section 26.

PART 3 EXECUTION

3.01 CONSTRUCTION

A. Surplus Material

1. Unless otherwise specified, surplus excavated material shall be disposed of off site in accordance with applicable ordinances and environment requirements at the expense of the Contractor.

B. Hauling

1. When hauling is down over highways or city streets, loads shall be trimmed and the vehicle shelf areas shall be cleaned after each loading.
2. Loads shall be watered after trimming to eliminate dust.

C. Subgrade

1. Unless directed otherwise on the drawings, existing subgrade shall be compacted to 90% RC, 12" in depth, prior to placement of base material.
2. Subgrade shall be inspected for compliance to the soils report by the Owner/Geotechnical engineer prior to filling or on achieving final cut depth.

D. Finish Grading

1. Finish surfaces shall be smooth, compacted and free from irregularities. The degree of finish shall be that normally obtainable with a blade-grader.
2. Finish grades shall be as specified on the plans, except where a local change in elevation is required to match existing conditions, or to ensure proper drainage.
3. When the work is at an intermediate stage of completion, lines and grades shall be as specified within ± 0.5 foot or as necessary to provide adequate drainage.

3.02 FIELD QUALITY CONTROL

- A. Fill material shall be placed in horizontal layers and compacted with power operated tampers, rollers, idlers, or vibratory equipment. Material type, maximum layer depth, relative compaction, and general application are specified in Table A, below. Unless otherwise specified, fill classes shall be used where specified in Table A under General Application.

Table A: Fill Classification			
Material Type	Maximum Uncompressed Layer Depth (inches)	Minimum Relative Compaction (percent)	General Application
Aggregate Base	8"	95%	Pavement Grades

3.03 TESTS

- A. Inspection Trenches
 - 1. Owner will direct Contractor to construct inspection trenches in compacted or consolidated backfill to determine that Contractor has complied with these Specifications.

END OF SECTION

SECTION 31 23 19 - DEWATERING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications and procedure for the dewatering of excavations and disposal of water.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 31 23 33 – Trenching and Backfilling.

1.03 SUBMITTALS

- A. Prior to installation of the dewatering system, submit shop drawings and design data indicating the following:
 - 1. The proposed type of dewatering system.
 - 2. Arrangement, location and depths of system components.
 - 3. Complete description of equipment and instrumentation to be used, with installation, operation and maintenance procedures.
 - 4. Methods of disposal of pumped water.
 - 5. Necessary permits for water disposal.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Furnish all materials, tools, equipment, facilities, and services as required for providing the necessary dewatering work and facilities.
- B. Provide backup equipment as necessary for the replacement and for unanticipated emergencies.

PART 3 EXECUTION

3.01 DEWATERING

- A. Keep excavation reasonably free from water during construction.
- B. Disposal of water shall not damage property or create a public nuisance.
- C. Have on hand pump equipment and machinery in good working condition for emergencies and workmen available for its operation.
- D. Dewatering systems shall operate continuously until excavations are backfilled to finished grade or improvements are constructed to finished surface.
- E. Groundwater shall be controlled to prevent softening of the bottom of excavations, or formation of "quick" conditions.
- F. Dewatering systems shall not remove natural soils.
- G. Control surface runoff to prevent entry or collection of water excavations.
- H. Release of groundwater shall be controlled to prevent disturbance of the natural foundation soils or compact fill.
- I. There shall be no discharge of turbid water on site.
- J. Discharge or disposal of water shall be controlled to prevent erosion

END OF SECTION

SECTION 31 23 33 – TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for excavating, backfilling, and compacting for the installation of pipe and pipeline appurtenances.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 31 20 00 - Earthmoving.
- C. Section 31 23 19 – Dewatering.

1.03 REFERENCE STANDARDS

- A. City of Healdsburg Standard Specifications – Latest Edition
- B. City of Healdsburg Standard Plans – Latest Edition
- C. PG&E Standard Specifications – Latest Edition
- D. AT&T Standard Specifications – Latest Edition
- E. California Plumbing Code – Latest Edition
- F. Caltrans Standard Specifications and Drawings – Latest Edition

PART 2 PRODUCTS

2.01 BACKFILL MATERIAL

- A. Trench backfill shall consist of Class 2 Aggregate Base, unless otherwise noted.

2.02 PIPING MATERIAL

- A. All piping material shall conform to respective utility agency and the California Plumbing Code.

2.03 BURIED WARNING AND IDENTIFICATION TAPE

- A. Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3-inch minimum width, color coded as specified

below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

1. Warning Tape Color Codes.
 - a. Red: Electric.
 - b. Yellow: Gas, Oil; Dangerous Materials.
 - c. Orange: Telephone and Other Communications.
 - d. Blue: Water Systems.
 - e. Green: Sewer Systems.
 - f. White: Steam Systems.
 - g. Grey: Compressed Air.
2. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.
3. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3-feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.04 DETECTION WIRE FOR NON-METALLIC PIPING

- A. Detection wire shall be insulated single strand, solid copper wire with a minimum of 12 AWG.

PART 3 EXECUTION

3.01 EXCAVATION

A. General

1. Keep trench dry throughout construction operations
2. Trench excavation shall follow the alignment of the pipe or utility centerline
3. No more than 100 LF of trench shall be open at one time

B. Shoring and Bracing

1. Contractor is responsible for any damage or injury resulting from his construction operations. Contractor shall perform, at his own expense, all necessary repair work or reconstruction.
2. Contractor will be responsible for all shoring with bracing design and installation.

C. Excavation Required Beyond Trench Limits

1. Excavation (bell holes) where necessary in the sides and bottom of the trench at pipe joint locations shall be large enough to make joints and permit inspection.
2. Excavation to a greater depth than shown on the plans may be ordered by the Project Geotechnical Consultant if the native material at the bottom of the trench will not provide proper support for the pipe or if the excavation is in rock.
3. Remove all adjacent, saturated material where pipeline leaks occur.

3.02 UTILITIES

A. Location

1. Approximate known locations of underground utilities and structures are indicated on the plans. Contractor shall determine exact location of underground utilities and structures prior to construction.
2. Adjustments of pipe alignment and elevation will be authorized by the Owner where exploratory work indicates the need.

B. Excavation Around Utilities

1. Excavation and other work under or adjacent to utilities shall not interfere with their safe operations and use.

2. Probe carefully to determine the exact location of utility and hand excavate where necessary to avoid damage.
3. In the event of damage incurred during construction near such structures or property, Contractor shall immediately notify the Owner and other appropriate utility or public safety authorities and shall arrange for immediate repairs at Contractor's expense.

C. Tunneling Under Utilities

1. Tunneling may be allowed for short distances with the approval from the Project Civil Engineering Consultant.

3.03 BLASTING

- A. Blasting will not be permitted.

3.04 BACKFILL OF TRENCHES

- A. Prior to backfilling, the trench shall be cleared of all wood and debris.
- B. Backfill pipeline trenches to the level of the original ground surface or the underside of the pavement base course.
- C. Backfill material shall not be dropped directly on the pipe.
- D. Carefully remove timbering, sheeting, shoring and sheet piling, according to the instructions of the shoring system designer or the manufacturer, using methods that will minimize caving. If caving is occurring, the shoring system will be required to remain in place up to one to six inches above the top of the pipe.
- E. Jetting of trench backfill is not permitted.
- F. If trench has been excavated below the specified depth, that portion of the trench shall be backfilled with Class 2 or select material and compacted before pipe installation, at the Contractor's expense.
- G. If pipe or conduit has less than 18 inches of final cover, trench shall be backfilled with Control Density Fill (CDF) to a depth specified by the Engineer.

END OF SECTION

SECTION 32 01 16 – ASPHALTIC CONCRETE GRINDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for providing asphaltic concrete grinding as indicated.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 31 10 00 – Site Clearing
- C. Section 32 12 16 – Asphaltic Concrete Paving

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM Dxxx
- B. City of Healdsburg Standard Plans and Specifications, Latest Edition
- C. Caltrans Standard Specifications, Latest Edition

1.04 PROTECTION

- A. Protect concrete pavements and walks, curbs and bases, and other improvements adjacent to the operations with suitable materials. The Contractor shall be responsible for any damage caused by the Contractor's employees or equipment, and shall make necessary repairs. Building and other surfaces shall be covered with paper or other protection, where required. All damage caused by the Contractor's operations shall be prepared or replaced as required. Damage to the existing curb and gutter resulting from operating the grinding machine or the "hand" clearing operations shall be corrected, to the satisfaction of the Owner, by the Contractor at the Contractor's expense. Any required grinding is to be performed without disturbing the existing curb and gutter which may be cracked and fragile. Any concrete gutters chipped by the pavement grinding operations shall be epoxy patched and "Mason's mix" shall not be permitted.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION**3.01 PREPARATION**

- A. Sawcutting shall be performed prior to the pavement grinding operations at intersections and conforms. The requirement to sawcut may be waived where a minimum two inch vertical face transverse to the conform point can be provided.
- B. The Contractor shall notify homeowners forty-eight (48) hours in advance of grinding operations to cover parked vehicles or other personal items located in exposed areas.

3.02 LIMITS

- A. Limits of grinding are shown in the contract documents.
- B. No additional compensation shall be made for Pavement Grinding in excess of the limits shown on the plans unless so directed by the Engineer.

3.03 OPERATIONS

- A. Pavement Grinding shall be in accordance with the applicable provisions of Section 42-2 of the Standard Specifications and shall involve:
 - 1. Wedge Grinding (to conform new paving to curbs and gutters and drainage facilities): Wedge Grinding shall provide a triangular wedge of the width shown on the plans and of the depth at the lip of gutter pan as shown on the plans below the pan edge. Some of the existing paving has an existing lip of asphalt along the edge of gutter pans, and thus the Contractor shall expect to grind a total depth of asphalt greater than shown on the plans in some places which can be determined by the Contractor in his/her pre-bid inspection.
 - 2. Conform Grinding (to match a smooth profile to existing pavement): Conform Grinding shall provide a gradually increasing depth along the length of the road to conform to a required wedge grind at the edge of pavement.
 - 3. Full Width Grinding (to eliminate roadway crown): Full Width Grinding shall provide a minimum 2.0 inches of grind depth across the roadway between the gutter pans on each side.
 - 4. Corrective Grinding (to improve drainage and provide a smoother ride): Corrective Grinding will be as directed by the Engineer.

- B. In those areas where the existing asphalt pavement extends to the curb face over the P.C. gutter pan and is left after the grinding operation, the Contractor shall clear this residue asphalt pavement to the curb face. The area requiring "hand" clearing shall be that area between the edge of the grinding wedge left by operating the grinding machine to the curb face. The Contractor shall then use suitable methods to clear residue asphalt concrete from the gutter pan (grinding lip to curb face).
- C. Pavement Grinding shall be accomplished by a grinding machine having a cutter head at least six feet wide and shall be operated so as not to produce excessive fumes or smoke.
- D. At pavement grinding pavement conforms, immediately after performing the pavement grinding, the Contractor shall place temporary cutback asphalt to provide a smooth ramp for vehicular traffic. The cutback asphalt shall be maintained by the Contractor until overlay work has begun at which time all cutback asphalt shall be removed and disposed of.
- E. Residue from grinding shall be removed from the roadbed by sweeping immediately after grinding.
- F. The residue material ground from the roadway surface shall become the property of the Contractor who shall make arrangements for disposal outside the right-of-way.
- G. If, in the course of Pavement Grinding operations, the Engineer determines that the underlying base material is unsuitable and cannot be reworked or recompacted to effectively accommodate the subsequent new pavement, he may authorize the removal and/or stabilizing of base and/or subgrade material exposed by grinding in accordance with Section 10-1.17 of these special provisions.

PART 4 – PAYMENT

4.01 MEASUREMENT AND PAYMENT

- A. The respective contract prices paid per linear foot for Wedge Grinding and Conform Grinding and per square foot for Full Width Grinding shall include full compensation for furnishing labor, materials and equipment necessary to complete the work (including removing and disposing of pavement grindings and for "hand" clearing of pavement from gutter pans as shown on the plans and specified herein).

No adjustment in the respective contract unit prices for Wedge Grinding, Conform Grinding and Full Width Grinding shall be made for increases or decreases of more than 25 percent of the quantities set forth in the Schedule of Bid Prices.

The quantities to be paid for shall be to the specified dimensions of grinding regardless of the number of passes required to conform with the depth requirement shown on the plans.

END OF SECTION

SECTION 32 11 23 – AGGREGATE BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for furnishing, spreading, and compacting aggregate base course for pavements as indicated.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 03 30 01 – Cast-in-Place Concrete for Exterior Work.
- C. Section 32 16 13 – Concrete Curbs, Gutters and Walks.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 - 2. ASTM D3017 - Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- B. State of California, Department of Transportation (Caltrans), Standard Specifications
 - 1. Section 17 - Watering
 - 2. Section 26 – Aggregate Bases
- C. State of California, Department of Transportation (Caltrans), Standard Test Methods
 - 1. Calif. Test 201 - Method of Soil and Aggregate Sample Preparation Aggregates
 - 2. Calif. Test 202 - Method of Tests for Sieve Analysis of Fine and Coarse Aggregates
 - 3. Calif. Test 205 - Method of Determining Percentage of Crushed Particles
 - 4. Calif. Test 216 - Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates
 - 5. Calif. Test 217 - Method of Test for Sand Equivalent
 - 6. Calif. Test 229 - Method of Test for Durability Index

7. Calif. Test 301 - Method of Test for Resistance "R" Value of Treated and Untreated Bases, Subbases and Basement Soils by the Stabilometer

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate Base Material

1. Class 2 aggregate base shall be free of vegetable matter and other deleterious substances. Coarse aggregate, material contained on the No. 4 sieve, shall consist of material of which 25 percent by weight shall be crushed particles as determined by California Test Method No. 205. Class 2 aggregate base shall conform to one of the following gradings, determined in accordance with California Test Method No. 202:

Percentage Passing Sieves for 3/4 Inch Maximum	
Sieve Size	Percentage Passing
2 inch	---
1-1/2 inch	---
1 inch	100
3/4 inch	90-100
No. 4	35-60
No. 30	10-30
No. 200	2-9

2. Class 2 aggregate base shall conform to the following additional requirements:

Tests	Test Method No. Calif.	Requirements
Resistance (R-Value)	301	78 minimum
Sand Equivalent	217	22 minimum

Tests	Test Method No. Calif.	Requirements
Durability Index	229	35 minimum

B. Source Quality Control

1. Submit certificate of compliance for approval prior to installation of material.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Call for an inspection by the Engineer and obtain written acceptance of the prepared subgrade or subbase before proceeding with the placement of aggregate base course.

- B. The subgrade or subbase to receive aggregate base course, immediately prior to spreading, shall conform to the compaction and elevation tolerances indicated for the material involved and shall be free of standing water and loose or extraneous material.

3.02 INSTALLATION STANDARDS

- A. Aggregate base course shall be applied over the prepared subgrade or subbase and compacted in accordance with Section 26 of the Caltrans Standard Specifications.
- B. Aggregate base course shall be minimum uniform thickness after compaction of dimensions indicated. Where not indicated, compacted thickness shall be six inches for driveways/sidewalks and eight inches for roadways.
- C. All compaction expressed in percentages in this section refers to the maximum dry density as determined by California Test Method No. 216.

3.03 SPREADING OF MATERIAL

- A. Aggregate for base course shall be delivered as uniform mixture of fine and coarse aggregate and shall be spread in layers without segregation.
- B. Aggregate base course material shall be free from pockets of large and fine material. Segregated materials shall be remixed until uniform.
- C. Aggregate base material shall be moisture-conditioned to near optimum moisture content in accordance with the applicable requirements of Section 17 of the Caltrans Standard Specifications.
- D. Aggregate base course six inches and less in thickness may be spread and compacted in one layer. For thicknesses greater than six inches, the base course aggregate shall be spread and compacted in two or more layers of uniform thickness not greater than six inches each.

3.04 COMPACTING

- A. Relative compaction of each layer of compacted aggregate base material shall be not less than 95 percent as determined by California Test Method No. 216.
- B. Thickness of finished base course shall not vary more than 3/4 inch from the indicated thickness at any point. Base which does not conform to this requirement shall be reshaped or reworked, watered, and recompact to achieve compliance with specified requirements.
- C. The surface of the finished aggregate base course at any point shall not vary more than 3/4 inch above or below the indicated grade.

3.05 FIELD QUALITY CONTROL

22212.00

Sonoma County Library
Healdsburg Library Refresh
139 Piper St

- A. Perform field tests in accordance with ASTM D2922 to determine compliance with specified requirements for density and compaction of aggregate base material, and with ASTM D3017 to determine moisture-content compliance of the installed base course.

END OF SECTION

SECTION 32 12 16 – ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for providing asphaltic concrete paving as indicated.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 32 11 23 – Aggregate Base
- C. Section 32 17 23 – Pavement Marking

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
- B. City of Healdsburg Standard Plans and Specifications, Latest Edition
- C. Caltrans Standard Specifications, Latest Edition
 - 1. Section 39 - Asphalt Concrete
 - 2. Section 92 – Asphalts
 - 3. Section 93 – Liquid Asphalts
 - 4. Section 94 – Asphaltic Emulsions
- D. Caltrans Standard Test Methods, Latest Edition
 - 1. Calif. Test 202 – Method of Tests for Sieve Analysis of Fine and Coarse Aggregates
 - 2. Calif. Test 304 – Method of Preparation of Bituminous Mixtures for Testing
 - 3. Calif. Test 366 – Method of Test for Stabilometer Value
 - 4. Calif. Test 375 – Determining the In Place Density and Relative Compaction of AC Pavement

1.04 PROTECTION

- A. Protect concrete pavements and walks, curbs and bases, and other improvements adjacent to the operations with suitable materials. The Contractor shall be responsible for any damage caused by the Contractor's employees or equipment and shall make necessary repairs. Building and other surfaces shall be covered with paper or other protection, where required. All damage caused by the Contractor's operations shall be prepared or replaced as required.

PART 2 PRODUCTS

2.01 BASE COURSE MATERIAL

- A. Class 2 Aggregate Base. Percentage composition by weight of aggregate base material shall conform to the 3/4 inch maximum grading when determined by California Test 202.

2.02 TACK COAT (VERTICAL SURFACES)

- A. Tack Coat: Diluted SS-1 or SS-1h emulsion or undiluted RS-1 emulsion in conformance with Section 94 or the Caltrans Standard Specifications.

2.03 ASPHALT PAVING MATERIALS

- A. Paving Asphalt: All purpose, aged residue, steam refined, PG 64-16 grade, in accordance with Section 92 of the Caltrans Standard Specifications.
- B. Aggregate: Type A, with the grading of the combined aggregate conforming to 1/2 inch maximum size, medium grading, as specified in Section 39 of the Caltrans Standard Specifications.
- C. Mixing Facilities: Asphalt concrete surfacing material shall be furnished from an approved commercial asphalt central mixing plant.

2.04 SOURCE QUALITY CONTROL

- A. Contractor shall submit Certificate of Compliance from manufacturer for approval prior to installation.

PART 3 EXECUTION

3.01 PLACING OF BASE COURSE

- A. The Contractor shall call for an inspection by the Engineer and obtain written approval of the subgrade before proceeding with the base course.
- B. Base course shall be minimum uniform thickness after compaction of dimensions indicated. Where not indicated, compacted thickness shall be six inches for parking stalls and eight inches for roads, driveways, and aisles of parking areas.

- C. Base course shall be placed over finished subgrade and compacted in accordance with Section 32 11 23 - Aggregate Base.
- D. After base course has been completed, the Contractor shall call for an inspection by the Engineer and obtain written approval before proceeding with application of the asphalt wearing surface.

3.02 PLACING ASPHALT CONCRETE

- A. Areas to be paved shall be covered with a layer of hot asphalt concrete surfacing not less than the thickness indicated after compaction. Where not indicated, compacted thickness shall match existing, and be not less than 4 inches, for parking stalls. Compacted thickness shall match existing for roads, should improvements extend into existing roads. Compacted thickness shall match existing, and be not less than 4 inches, for driveways, and aisles of parking areas. Should the existing pavement thickness be greater than 4 inches, the compacted thickness shall match the greater thickness. The Contractor shall neatly pothole or core the existing pavement prior to construction and provide evidence of the existing pavement thickness to the Owner.
- B. Paving asphaltic concrete shall be delivered, laid, rolled, and finished in accordance with Section 39 of the Caltrans Standard Specifications.
- C. Before placing asphalt concrete, a tack coat (paint binder) shall be applied to all vertical surfaces against which asphalt concrete surfacing will be placed. Tack coat (paint binder) shall be applied in accordance with Section 39-4 of the Caltrans Standard Specifications at the rate of from 0.02 to 0.10 gallons per square yard.
- D. Finish surface of the wearing course shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, cold joints, or other irregularities.
- E. Finish paving shall conform to slopes, lines, and finish grades indicated, and shall drain properly. Where adjacent surfaces are intended to be flush (as at concrete gutters, walks, and paving), they shall conform smoothly at all joints.
- F. Ridges, indentations, and other objectionable marks left in the surface of the asphalt concrete by paving or rolling equipment shall be eliminated by rolling. The use of equipment that leaves ridges, indentations, or other objectionable marks in the asphalt concrete shall be discontinued, and other acceptable equipment shall be employed.
- G. Where cold joints are indicated or necessary, cut back the placed and compacted cold asphalt a minimum of three inches with a concrete or masonry power saw, so that a vertical face of compacted full thickness material is exposed. Treat this surface with a tack coat before proceeding with the placement of new asphaltic concrete surfacing.

- H. Finish paving shall conform to finish elevations within plus or minus 0.01 of a foot and shall be level to within plus or minus 1/4 inch in 10 feet when measured with a 10 foot straightedge in any direction.

3.03 FIELD QUALITY CONTROL

- A. The Contractor shall control the quality of the work and shall provide adequate testing to assure compliance with these Specifications.
- B. After completion of paving work, all paving shall be flooded with water, and any resulting “ponds” shall be ringed with chalk. Such hollows shall be corrected with addition of asphalt paving materials and rerolling until all paving is completely level and free from hollows and high spots.
- C. The Engineer shall perform in-place density and compaction tests of the completed pavement in accordance with California Test 375 to determine compliance with specified requirements. Test shall be performed as often as necessary to verify compliance, but not less frequently than the following:
 - 1. One test for each street or driveway intersection for which asphalt pavement replacement is required.
 - 2. One test for every 1,000 square yards of asphalt pavement at locations where the paved area exceeds 1,000 square yards.

3.04 MAINTENANCE OF PAVEMENT

- A. Upon completion of final rolling, traffic shall not be permitted on the finished pavement for at least six hours, and until the asphalt concrete has cooled sufficiently to withstand traffic without being deformed.
- B. Finished pavement shall be maintained in finished clean condition until the work is accepted by the Owner.

END OF SECTION

SECTION 32 16 13 – CONCRETE CURBS, GUTTERS AND WALKS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for providing Portland Cement concrete curbs, gutters and sidewalks, as indicated.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 03 30 01 – Cast-in-Place Concrete for Exterior Work
- C. Section 32 11 23 – Aggregate Base

1.03 REFERENCE STANDARDS

- A. American Concrete Institute (ACI):
 - 1. ACI 301 – Standard Specifications for Structural Concrete
 - 2. ACI 318/381R – Building Code Requirements for Structural Concrete and Commentary
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - 2. ASTM A615/A615M – Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 3. ASTM A663/A663M – Specification for Steel Bars, Carbon, Merchant Quality, Mechanical Properties.
 - 4. ASTM 260 – Specification for Air Entraining Admixtures for Concrete
 - 5. ASTM 309 – Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - 6. ASTM C881 – Specification for Epoxy-Resin-Base Bonding Systems for Concrete
- C. City of Healdsburg Standards and Specifications, Latest Edition

1.04 SUBMITTALS

A. Product Data

1. Respective manufacturer's product data for manufactured products.

1.05 QUALITY ASSURANCE

A. Tolerances

1. Construct concrete surfaces within 1/4 inch of the indicated elevation, and deviating not more than 1/8 inch from a 10 foot straightedge placed anywhere on the surface.
2. Slab tolerances shall be as specified in ACI 301.

B. Finishes

1. Slab finishes shall be as specified herein accordance with the requirements of ACI 301.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide Class of Concrete indicated on the Contract Drawings or Construction Drawings.

1. Provide air-entrainment of three percent (\pm one percent) with admixture conforming to ASTM C260.
2. Nominal size of large aggregate shall be one inch.
3. Minimum total cement content shall be 520 pounds per cubic yard of concrete.
4. Minimum strength of concrete shall be 3000 psi.

B. Tie Bars

1. ASTM A615, Grade 60, of type and size indicated.

C. Dowels

1. Plain round bars meeting requirements of ASTM A615/A615M, Grade 60, of ASTM A663/A663M, Grade 80, epoxy-coated bars, furnished with approved snugfitting ASTM A53 galvanized pipe sleeve. Provide sleeve with one end closed.

D. Weep Holes

1. ASTM A53 galvanized pipe of size indicated.

- E. Concrete Curing Compound
 - 1. ASTM C309, Type 1.
- F. Epoxy Adhesive
 - 1. ASTM C881, Type V for load bearing concrete, Grade and Class as determined by project conditions and requirements.

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE

- A. Excavate for and prepare the subgrade as specified true to the indicated grade and cross section.
- B. Test completed subgrade for correct grade and cross section by means of template supported on side forms.
- C. Dampen subgrade and forms just before placing concrete.

3.02 TYPES OF CONSTRUCTION

- A. Provide cast-in-place concrete construction, plain or reinforced as indicated. Curbs, gutters, and walks shall be formed accurately to the indicated section profile with template screed.
- B. Extruded curbs and gutter, placed by an extrusion machine, may be provided where site conditions are suitable and the extrusion process is appropriate for the purpose.

3.03 JOINTS

- A. Expansion Joints
 - 1. Construct 1/2 inch thick expansion joints in the following locations
 - a. In curb and combination curb and gutter at the locations of expansion joints in the concrete roadway.
 - b. In curb or combination curb and gutter, at points where curved and tangent sections join.
 - c. Between curb or combination curb and gutter, and any drain inlet, or similar structure occurring within the limits of the curb or combination curb and gutter.
 - d. At corners in sidewalks, following the projections of the building lines from the corner of the building to the curb.

- e. Between sidewalks and any permanent structure.
 - f. Between sidewalk and curb.
2. Construct 1/4 inch thick expansion joints in the following locations:
 - a. Through sidewalks at intervals not greater than 15 feet.
 - b. In sidewalks, encircling fixtures more than 12 inches in diameter.
 3. Construct expansion joints as specified in UCS, except that load transfer devices will not be required unless indicated. Shape preformed filler to cross section of curbs and combination curb and gutter.
- B. Contraction Joints
1. In sidewalks, construct contraction joints in uniform intervals not greater than six feet, by means of a suitable tool which will form a groove 1/2 inch deep and 1/4 inch wide, with the edges rounded to a 1/4 inch radius.
- C. Tooling
1. Finish joints with an edging tool having 1/4 inch radius, leaving joints free of mortar and concrete. In preformed type joints, leave joint filler material exposed for full length of joint with clean and true edges.
- D. Joint Sealing
1. Seal to within 1/8 inch of pavement surface all joints in curbs and gutters, including gutter surfaces of combination curb and gutter sections, all joints between curbs and vehicular pavement, all joints between gutters and vehicular pavement, and all other expansion joints. Do not seal other joints unless so indicated.
 2. Do not seal joints until concrete curing is complete. Prior to installation of the joint sealing compound, clean the joints of dirt and other foreign material. Joints may be cleaned with compressed air jets provided that the air in such jets is free of oil or water. Do not fill joints when there is any free water in or adjacent to joints. Joint walls and all surfaces to which the sealing material is to adhere shall be surface dry for at least three hours prior to sealing.
 3. Apply with approved pressurized equipment. Perform sealing joints to make them impervious to water and to prevent the sealing compound from spreading over the surface of the pavement.

3.04 FORM REMOVAL

- A. Remove front curb forms not less than two or more than six hours after placing concrete, but in no case while the concrete is still plastic enough to slump.
- B. Remove other forms not less than 12 hours after finishing is completed.

3.05 FINISHING

A. Curb and Combination Curb and Gutter

- 1. Trowel the face of curb smooth to a depth of not less than two inches below the flow line, or the flow line of integral curb and gutter, and finish with a steel trowel, all immediately after removal of front curb forms.
- 2. Finish all curb edges with a radius of 1/2 inch.
- 3. Provide a final fine brush finish to both top and face of curb with brush strokes parallel to the line of the curb, so that both top and front face present the same uniform appearance.
- 4. Keep the curb face wet during above finishing operations.
- 5. Allow no coarse aggregate to show on the finished curb surface.

B. Sidewalk and Ramps

- 1. After the concrete has been placed, consolidated, struck off, leveled, grooved and edged as specified herein, and in UCS, do not work the concrete further until ready for floating.
- 2. Provide "floated finish" or light "broom finish" as indicated in accordance with the requirements of ACI 301.
- 3. For pedestrian and wheelchair ramps, and all other surfaces where the Contract Drawings require a non-slip finish, provide a "non-slip finish" in combination with a "floated finish" or "broom finish" in accordance with the requirements of ACI 301.
- 4. Broom finish shall be applied perpendicular to the direction of traffic flow.

C. Joints and Edges

- 1. As soon as the condition of the work permits, perform joint work, edging and marking. Finish all edges with a radius of 1/4 inch.

3.06 CURING AND PROTECTION

22212.00

Sonoma County Library
Healdsburg Library Refresh
139 Piper St

- A. Comply with the applicable requirements for curing concrete with liquid membrane-forming curing compound. Do not permit traffic on new concrete pavement until the concrete has cured a minimum period of ten days.
- B. Provide damp curing only for concrete slab surfaces indicated to be treated with concrete hardener and dust proofer.

3.07 FIELD QUALITY CONTROL

- A. The engineer shall perform inspections and tests. The Contractor shall provide such samples and services to facilitate testing.

END OF SECTION

SECTION 32 17 13 – PRECAST PARKING BUMPERS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specifications furnishing and installing precast plastic parking bumpers (wheel stops) for vehicular parking stalls as indicated.

1.02 RELATED REQUIREMENTS

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

1.03 REFERENCE STANDARDS

- A. State of California, Department of Transportation (Caltrans), Standard Specifications, Latest Edition
 - 1. Section 95 - Epoxy

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Shop drawings of bumpers, including installation details, for approval.
- B. Product Data
 - 1. Manufacturer's product data of precast bumpers and epoxy adhesive for approval.

1.05 QUALITY ASSURANCE

- A. Precast parking bumpers shall be manufactured for the purpose by a company of firm specializing in the manufacture of precast plastic parking appurtenances.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Parking Bumpers
 - 1. Precast plastic parking bumpers of half hexagonal configuration and dimensions indicated. Unless indicated otherwise, provide bumpers of 48 inch length.
 - 2. Bumpers shall be manufactured with 100% solid, recycled plastic to withstand constant use and rough service. Each bumper shall be supplied with (2) two asphalt installation hardware.
 - 3. Each bumper shall be manufactured with two holes to accommodate the installation hardware. Holes shall be positioned six inches from each end.

B. Adhesive

1. Adhesive for anchoring bumpers or wheel stops to pavement shall be an epoxy adhesive manufactured for the purpose, similar and equal to the adhesives specified in Section 95 of the Caltrans Standard Specifications Article 95-2.04 or 95-2.05.

C. Bumpers

1. Bumpers shall be Model SHRT4/YL by Barco Products or equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Bumpers shall be anchored and secured in position as indicated with two hardware elements and an appropriate epoxy adhesive in accordance with the parking bumper manufacturer's installation instructions and recommendations.

END OF SECTION

SECTION 32 17 23 – PAVEMENT MARKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for providing traffic striping and control markings on pavement, parking stall striping, and painted curbs as indicated.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 32 12 16 – Asphalt Paving

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM Dxxx
- B. City of Healdsburg Standard Plans and Specifications, Latest Edition
- C. Caltrans Standard Plans, Specifications and Traffic Manual, Latest Edition
 - 1. Section 84 Traffic Stripes and Pavement Markings
 - 2. Section 85 Pavement Markers
 - 3. Traffic Manual
- D. Caltrans Standard Test Methods, Latest Edition
 - 1. Calif. Test 669 – Testing for Specification Compliance of Non-Reflective and Reflective Pavement Markers
- E. California Air Resources Board (CARB)
 - 1. CARB/VOC Permissible Content of Volatile Compounds (VOC in Paints)

1.04 SUBMITTALS

- A. Shop Drawings

1. Submit drawings and diagrams, indicating stripe width of roadway divider stripes and parking stalls, configuration and dimensions of directional arrows, style and size of letters for “compact car” designation, configuration and dimensions of international handicapped symbol, and any other traffic control markings on pavement, such as “in” and “out” or “enter” and “exit” designations.
- B. Certificate of Compliance
1. Submit evidence or affidavit which certifies that paint to be used complies with latest CARB/VOC regulations.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Traffic Line Paint
1. Provide paint conforming to the requirements of Section 84 of the Caltrans Standard Specifications, white in color for traffic striping, parking stalls, and other control markings on pavement, yellow in color for traffic control markings where indicated, blue in color for handicapped parking stalls, red in color for curbs where no parking is indicated, white in color for curbs where passenger discharge and pickup is indicated.
- B. Thermoplastic Traffic Stripes and Pavement Markings
1. Provide thermoplastic traffic stripes and pavement markings where indicated, including glass beads, conforming to the requirements of Section 84 of the Caltrans Standard Specifications.
- C. Paint for parking stalls and ADA Striping shall be waterborne, white, State Specification PTWB-01R2 (April 2023)
- D. Markers
1. Provide markers and adhesive in accordance with Division IX of the Caltrans Standard Specifications.
 2. Markers for hydrants 4” x 4” x ¾”, blue prismatic, high-impact plastic conforming to ASTM D-788, Grade 8 and shall conformed to the local Fire Protection District Standards. The hydrant markers shall be attached to the pavement using a hot melt bituminous adhesive conforming to Section 85 of the Standard Specifications.

PART 3 EXECUTION

3.01 APPLICATION

- A. Provide traffic striping and control markings on pavement and parking stalls in accordance with the layout, configurations, and dimensions indicated on the Contract Drawings or Construction Drawings and approved shop drawings.
- B. Paint application equipment shall conform to the requirements of the Caltrans Standard Specifications. Place markers in accordance with Section 85 of the Caltrans Standard Specifications.
- C. Traffic control markings and parking stalls shall be applied with the use of substantial cutout patterns and templates, or with striping equipment which applies straight, uniform width, sharp lines. Coverage of paint shall be thorough and complete in accordance with the paint manufacturer's instructions and recommendations.
- D. Where "enter" and "exit" control markings are side-by-side on pavements, indicating two-way traffic, such as "enter and "exit" designations shall be different colors, such as white and yellow, with a centerline separating the two directions of traffic.
- E. Traffic control markings and parking stalls shall be sharp and accurate, straight where required, without fuzziness at edges of lines.
- F. Accessible parking stalls shall include the International Symbol of Accessibility.
- G. At completion, Contractor shall check the work thoroughly and shall touch-up traffic control markings and parking stalls which are not distinct or thorough in coverage, or which are not uniform in color.
- H. Pavement markers shall be placed according to the State Traffic Manual details, except as modified by the project plans or Engineer. All missing and/or broken reflectors shall be replaced within the project limits. The blue reflector shall be installed in the center of the traffic lane adjacent to each fire hydrant. It is the contractor's responsibility to locate each fire hydrant. Pavement markers shall be applied within four days of resurfacing.

3.02 FIELD QUALITY CONTROL

- A. Perform tests in accordance with Caltrans Test 669 to verify compliance with Specification requirements.

END OF SECTION

SECTION 32 17 13 – TACTILE WARNING SURFACING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specifications for all labor, material, tools, equipment and services necessary to complete the installation of detectable/tactile warning surfaces (either surface applied Vitrified Polymer Composite, VCP, or cast-in-place high strength reinforced concrete composite in non-vehicular areas, at the bottom of curb ramps and other locations such as depressed corners, raised crosswalks, raised intersections, borders of medians and islands, the edge of transit platforms, and sidewalks where railroad tracks cross to warn pedestrians of an upcoming change from pedestrian to vehicular way.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 32 16 13 – Concrete Curbs, Gutters and Walks

1.03 REFERENCE STANDARDS

- A. Rehabilitation Act of 1973 and the American with Disabilities Act Section 504 28 CFR Part 35 Title II and 28 CFR 36 Title III.
- B. California Code of Regulations (CCR): Title 24, Part 2, Section 205 definition of Detectable Warning. Section 1117A.4 and 1127B.5; Section 1133B.8.5.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Material Test reports.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
 - 5. Maintenance instructions for tactile warning panels as required.
- B. Shop Drawings:
 - 1. Provide fabrication details, tactile warning panel surface profile, and plans of placement including joints.
- C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color and patterns.

1.05 HANDLING

- A. Warning Panels shall be packaged or crated to prevent damage in shipment or handling.
- B. Store products under cover in manufacturer’s unopened packaging until ready for installation.
- C. Store pallets on supported flat surface. Do not double stack pallets.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Detectable Warning Surface:
 - 1. Color: Verify with local jurisdiction for required color.
 - 2. Type: Tactile warning surface shall be prefabricated panels, either adhesive applied or cast-in-place as manufactured by “Detectable Warning Systems, Inc.” or approved equivalent.

PART 3 EXECUTION

3.01 PREPARATION

- A. Temperature:
- B. Surface: Apply on asphalt or concrete surfaces.
 - 1. Surface must be free of dirt, dust, deicing agents, chemicals and significant oily substances.
 - 2. Concrete surfaces must have surface porosity.
 - 3. Do not apply on top of previous markings or coatings.
 - 4. Follow manufacturer’s written instructions on how to prepare surface.

3.02 INSTALLATION

- A. Follow manufacturer’s written installation instructions.

END OF SECTION

SECTION 33 40 00 – SITE DRAINAGE SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for furnishing, spreading, and compacting aggregate base for pavements as indicated.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 31 23 33 – Trenching and Backfilling.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM D3034 – Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- B. City of Petaluma Standard Plans and Specifications, Latest Edition
- C. Caltrans Standard Specifications, Latest Edition

1.04 SUBMITTALS

- A. Product Data
 - 1. Submit manufacturer’s product data for pipe and pipe connection materials.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pipe Connection Requirements
 - 1. Ends of pipe shall be bell and spigot to assure continuous alignment of pipe and leakproof joints.
- B. Polyvinyl Chloride Pipe (PVC) and Fittings
 - 1. PVC Pipe and Fittings shall conform to ASTM D3034, SDR 26

PART 3 EXECUTION

3.01 INSTALLATION OF PIPE

A. Laying Pipe

1. Lay pipe to line and grade indicated. Bell and spigot type, lay bells in cross-cuts cut into trench. Lay pipe with the bell or grooved end uphill.
2. Prevent dirt from getting into pipe joints.
3. Remove pipe which is cracked, checked, spalled, or damaged from the work.
4. Clean interior of pipe of cement, dirt, and extraneous matter as the work progresses.

B. Pipe Joints

1. Pipe joints shall be made secure and watertight.
2. Employ appropriate equipment to draw the sections of the pipe slightly together.

C. Visual Test Method

1. Slowly pull a television camera through the storm drain and inspect for visual leaks, separated joints and cracks in the pipe. Repair leaks and joints. Replace cracked pipe. Re-inspect pipe. Submit tape of entire length of system to Owner for approval.

D. Backfilling

1. Piping shall not be covered with backfill material, until inspected, and approved by the Owner.
2. After making up pipe joints, fill space between pipe and sides of trench with backfill material half-way up the pipe. Both sides shall be filled for full width of trench at the same time and carefully compacted so as to hold the pipe in its proper position.
3. After pipe has been installed, inspected, and approved, place and compact backfill as specified in Section 31 23 33 – Trenching and Backfilling.

END OF SECTION